THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXI. No. 1821.] LONDON, APRIL 5, 1898. [50TH YEAR. PRICE 6d.

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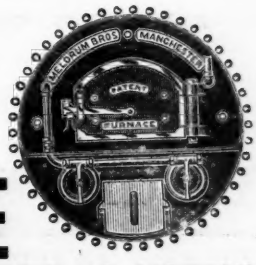

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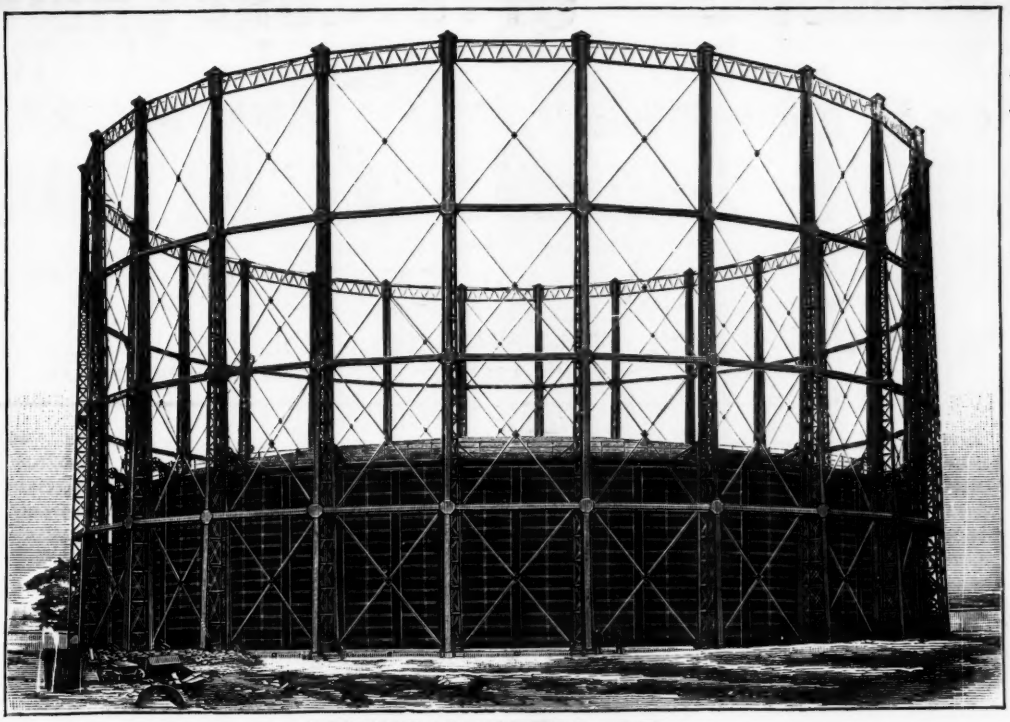

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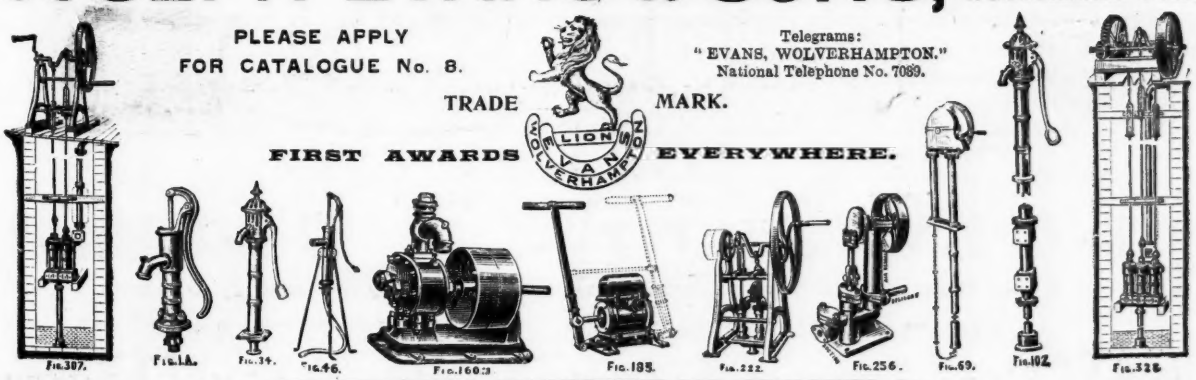

Fig.307. Fig.1A. Fig.34. Fig.46. Fig.160B. Fig.185. Fig.222. Fig.256. Fig.69. Fig.102. Fig.328.

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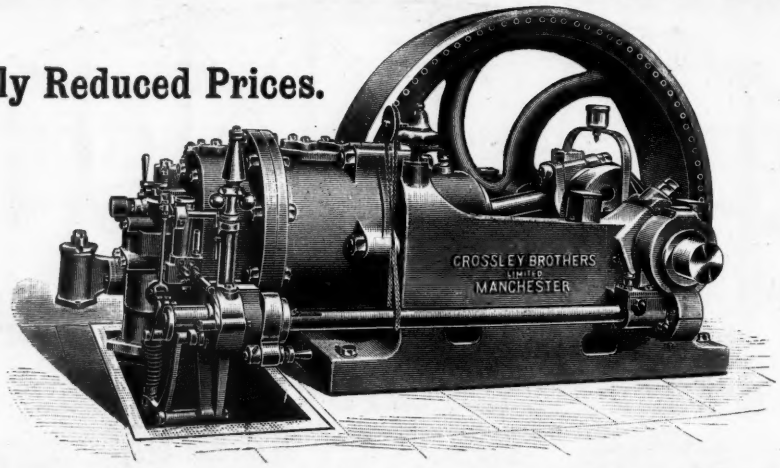

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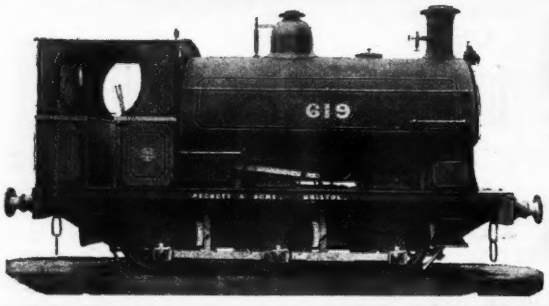

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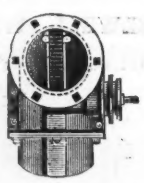

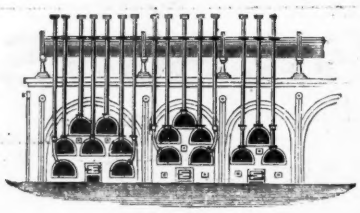

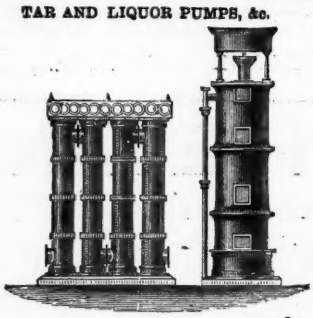

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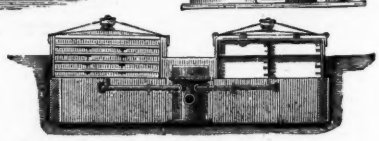

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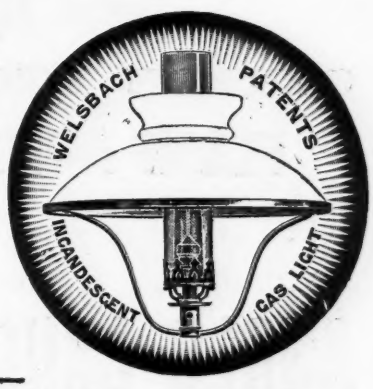

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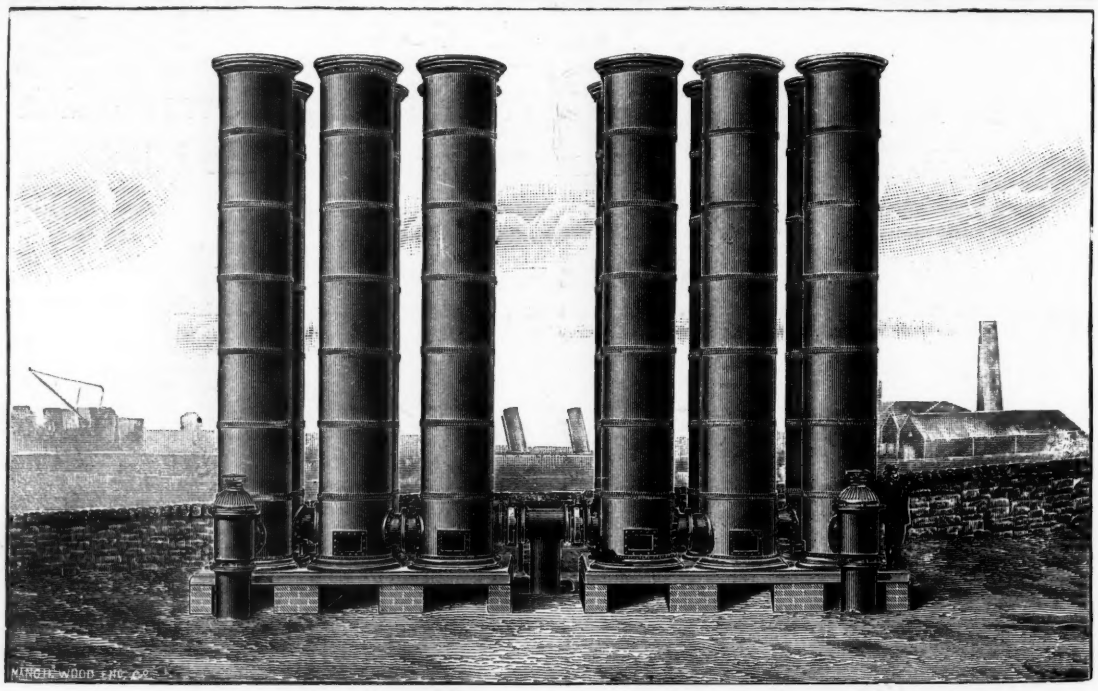

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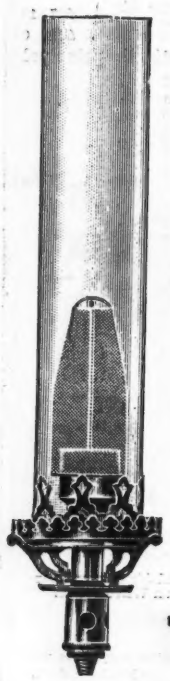

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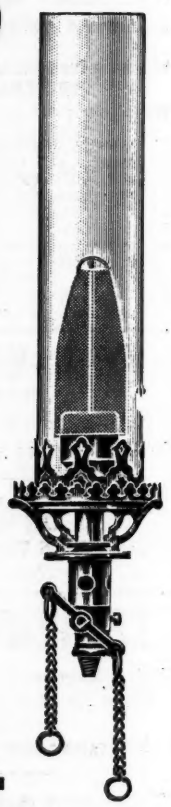

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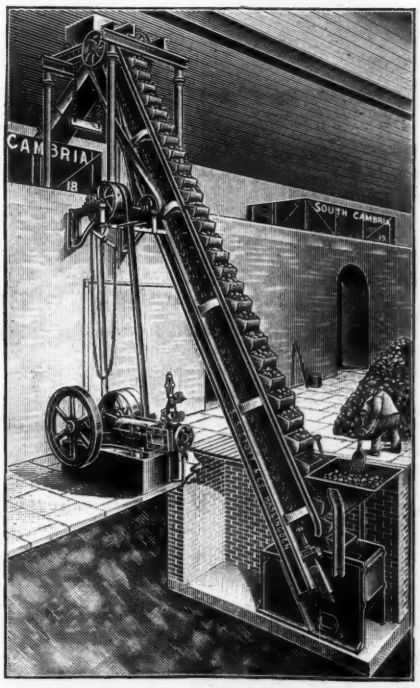

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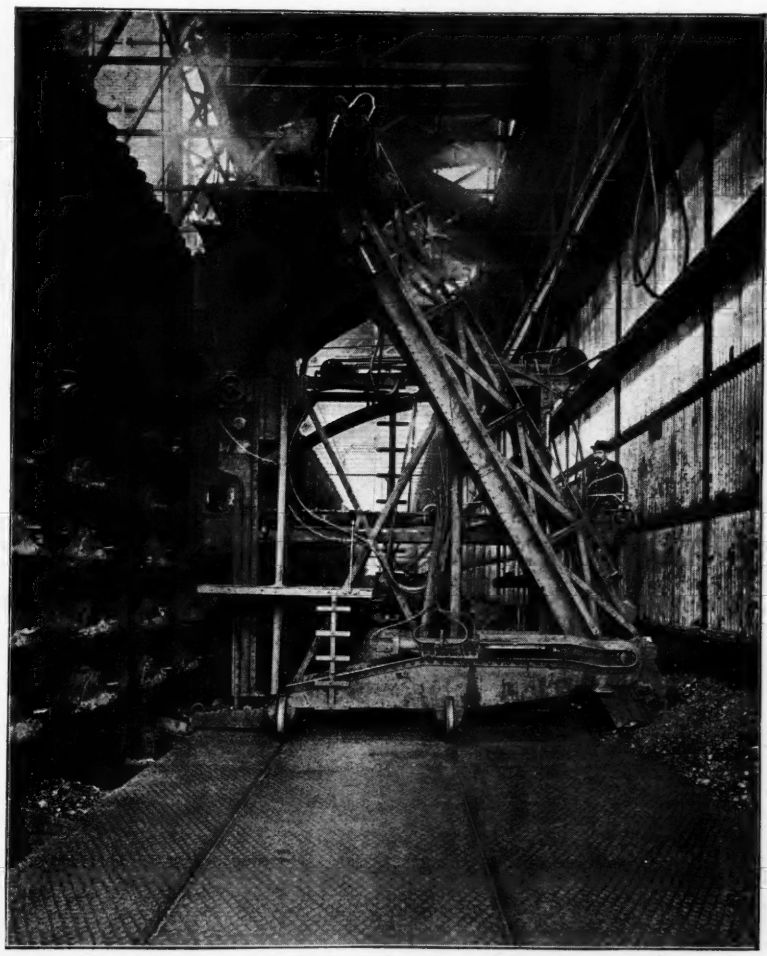

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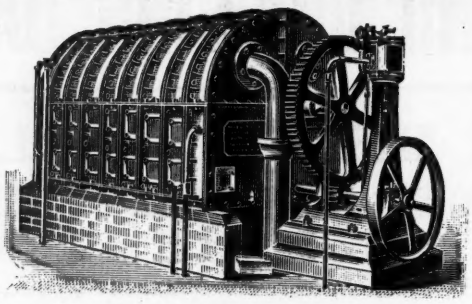

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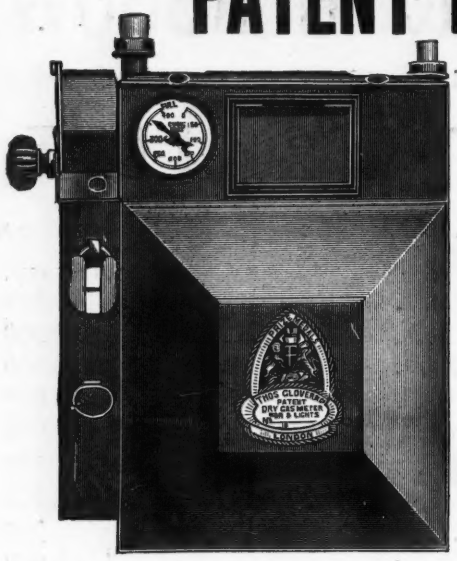

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EDITORIAL NOTES.

The Agitation against The Gaslight and Coke Company.

It is an unpleasant duty to record the fact that the agitation provoked by the increase in the price of gas notified by The Gaslight and Coke Company to private consumers in the district north of the Thames appears to be gaining strength. Yesterday a question was on the paper to be asked of the First Lord of the Treasury, suggesting the appointment of a "Committee to inquire as to the prices "charged by The Gaslight and Coke Company for gas for "the last ten years; the profits earned during the same "period; and the difference in the price of gas supplied on "the north and south sides of the Thames." The answer was given by Mr. Ritchie, who said that such a Committee did not seem necessary; but that a return covering the information required might be moved for. On Monday of last week, as will be seen by the report which appears in another column, a conference of delegates from Vestries and District Boards north of the Thames, and within the area of The Gaslight and Coke Company, was held at the Clerkenwell Town Hall, to consider the increased price of gas. Sixteen Metropolitan Local Authorities were represented. The character of the speeches delivered on the occasion need not be particularized. The first resolution, moved by a Chelsea delegate, called for a Board of Trade inquiry into "the past and present management and working of The Gaslight and Coke Company; "their existing statutory rights; and the past results, financial and general, of the statutory sliding-scale of price "and dividend, with a view to putting an end to the existing anomaly whereby gas consumers on the north side "of the Thames have to pay 3s. per 1000 cubic feet as "against 2s. 3d. per 1000 cubic feet charged on the south "side." The resolution was unanimously carried. Another resolution asked Parliament to refuse to pass the Company's Bill "unless the Company make some substantial "concession to the consumers in the form of a reduction in "the price of gas." This resolution was also carried. It was intimated that the Chairman would forward a letter to the Board of Trade embodying the first resolution. The answer will be that the Department has no power to interfere between the Company and the consumers so long as the statutory requirements affecting the undertaking are duly satisfied.

The Report and Accounts of the Commercial Gas Company.

The report of the Directors of the Commercial Gas Company for the past half year, and the statement of accounts, have been issued in the usual form. The same rates of dividend are recommended as have been paid for some time past; but the necessary amount of money for this purpose has not been earned, and the deficiency, which is small, will be taken out of the reserve fund. The revenue account shows a net profit for the half year of £47,910, making, with nearly £297 received for interest, £48,207. Adding the amount brought forward from the previous half year, and deducting the charge for interest on debenture stock, the amount available for dividend is £45,288. On the face of the statement, it is regrettable that the Company have not actually earned their dividend, especially as the latter stands at a high figure; but the circumstance is capable of being used as evidence that the Company's selling price—2s. 6d. per 1000 cubic feet—is as low as it can prudently be fixed. The sum received for gas—£148,392—is a substantial increase upon the rental of £141,807 for the corresponding half of 1896. Unfortunately, the residuals have again proved disappointing—a revenue from this source in that period of £38,358 having dropped to £34,534, notwithstanding a recovery in sulphate. The entries on the expenditure side of the account do not call for much comment. The cost of gas manufacture has risen from £113,100 to £116,914. The rest of the working expenses show little change. In the other accounts, the most notable entry is that which shows the depletion of the stock of sulphate from 1950 to 222 tons. Coke has gone off well enough; but for less money. Tar is obviously a drug; but the Company are wisely letting it go at that. One of the most cheering facts exhibited by these accounts is that of the substantial progress of prepayment meter supply in the Commercial district. This circumstance is not only of good omen for the Gas Company, but it also goes to prove that the condition of the working population of the East-end cannot really be so

desperate as the amateurs of "slumming" in these regions would have the world believe. The ordinary general meeting of the Company is called for Thursday next.

The Exeter Controversy.

THE discussion which has been carried on in the Exeter newspapers respecting the placing of the order for a new gasholder and tank for the Exeter Gas Company, is from many points of view regrettable. It appears to evidence an under-current of hostility between the Company and a firm of manufacturers who have long carried on business in that city, and are held in esteem in the district; while it has given, as any such controversy must do, occasion for the enemy to blaspheme. With the private aspect of the question we have no concern. Messrs. Willey and Co. may have felt that circumstances justified them in asking for a general arbitration clause under the contract; while the Directors seem to have come to the conclusion that they were acting in the highest interests of the Company in passing over a tender hampered by such conditions, even though this meant paying more for the work. These are matters between the firm and the Company of which the parties themselves are the best, if not the sole, judges. It is probable that nothing would have been publicly heard of the difference had it not happened to arise at a moment when Exeter was seriously discussing all sorts of suggestions for improving and extending its industrial interests. At such a time it came as a shock to find, as one writer put it, that "a severe blow had been dealt "at the trade of the city by gentlemen themselves engaged "in business, and dealing with money drawn entirely and "exclusively from the pockets of the citizens." It is this aspect of the question which seems to us of more than local interest. Wittingly or unwittingly, the Directors of the Gas Company have brought about their ears a hornets' nest of criticism and reproof which can scarcely be to the Company's interest just when it is brought face to face with keener rivalry than it has ever yet experienced. On the one hand, it is said: "If they treat us in this way, why "should we not turn the tables upon them?" and though it may be less easy to boycott the Exeter Gas Company than it was to boycott an Irish landlord in the old days, it is not pleasant to think it possible that such a suggestion should be made. Then, on the other hand, there are letters in the papers from the class of people, with predatory instincts, who look upon all Gas Companies as fair game because they pay big dividends. One of these gentlemen wants to know how the Company are treating their customers; and he puts forward, in the form of questions, a number of insinuations as to the amount of the dividend paid and the reserve fund accumulated, and introduces, with the obvious intention of raising prejudice against the Company, a hint that they intend to supply water gas. Though none of this has the least connection with the contract for the gasholder, it is useful as an illustration of the eagerness with which advantage is taken of any excuse for criticizing and abusing a Gas Company. It is criticism of a kind which bears fruit in ill-will and hostility such as may ripen inconveniently in future years.

The Costs in the Matlock Bath Gas-Works Purchase.

YESTERDAY was a day of excitement at Matlock Bath, on account of the election for members of the District Council. It will be remembered that, not very long ago, the Council purchased the undertaking of the Matlock Bath Gas Company; and it appears that the attendant expenses amounted to somewhere about £5700. In the "JOURNAL" for the 24th of August last year, when referring to the winding up of the Company, we commented rather strongly upon the fact that a transfer of works for which a sum of only £17,500 was to be paid should have cost the parties upwards of £8000, about three-fourths of which have, it now turns out, to be borne by the District Council. The question of these expenses has for some time caused a certain amount of uneasiness in the district; and, from what we learn, the Council did not manifest any great desire to make known the cost at which the purchase scheme had been carried out. At length, however, the "little bill" was published in a local paper; and then there was a sensation. The Council do not appear to have been abashed thereby; for when the time for the election of a new Council came, the retiring members offered themselves. But it was quite certain that they would be opposed; and in due course their opponents appeared in the field, armed with this list of expenses as their principal weapon of attack. A copy was sent to each ratepayer, accompanied by the new candidates' reasons for soliciting the suffrages of their fellow-townsmen. The contest was therefore fought on these expenses; and it has given rise to a most deplorable amount of bitterness and ill-feeling—things being said which will rankle for years. Certainly, a policy of economy seems called for. It is stated that within the last twenty years the district rate has increased 50 per cent.; and it is felt that a change is required in the financial policy of the Council. If the object in acquiring the gas undertaking was to utilize the profits in relief of the rates, we are afraid, judging by the results of the past few years' working, that they will not be sufficiently large to make a very appreciable difference. However, the Council have possession of the undertaking; and they will doubtless make all they can out of it. It has cost them £5700 to acquire, and the Gas Company about £3000 to sell; and we cannot help repeating the remark made when referring to this matter last August, that it is a scandal that so small a business as this transfer was should have been so expensive to conduct.

The Relative Strictness of Gas and Electric Lighting Works Accounts.

IN the course of an editorial discussion as to the qualities and prospects of the new 200-volt incandescent electric lamps, which are admitted to be imperfect things in themselves, but calculated to conduce to the perfectibility of central electric lighting stations on the continuous-current system, our usually fair contemporary "Engineering" has indulged in an uncalled-for slur upon gas company finance. It was necessary to argue that electricity distribution at high voltage is good for the consumer in the long run; and in pursuance of this contention, it was stated that "in "electric lighting, every economy is to the advantage of "the consumer, for under the system of account-keeping "insisted on by the Government, every detail of working is "revealed, and it is not possible for officials to have the "pleasant times which often prevail in gas-works." There is a very unwholesome suggestion here which is altogether extraneous to the argument. If the words mean anything, which is doubtful, they must mean nothing else than that the statutory account-keeping of gas undertakings is more lax than that which is imposed on electric lighting undertakings. Where is the justification for this statement? Is not the form of accounts legalized by the Electric Lighting Acts modelled upon earlier gas legislation? So far from the statutory accounts of electric lighting undertakings being exhaustive, our electrical contemporaries who make a point of analyzing such accounts have had to complain that the form in which they are published does not give a full statement of the affairs of those undertakings which for any reason do not court publicity. We protest against the insinuation that conductors of gas-works have "pleasant times" in the sense of being able to present accounts more favourably "cooked" than is possible in the case of electric lighting undertakings. If gas making has a financial advantage over electric lighting, this is not the way of it.

The Associated Chambers of Commerce.

IT is one of the weaknesses of these associations or other associations which are so marked a characteristic of the era—such as Trade Union Congresses and the like—that they are liable to become the happy hunting-ground of faddists. A supercilious public only laugh at the Trade Unionists assembled in annual congress for passing without a second thought resolutions in favour of the most outrageous communistic nostrums; but the Association of Chambers of Commerce met the other day, and enjoyed itself very much in the same manner. There is, of course, a difference. The collection of mercantile and social respectabilities presided over by Sir H. Stafford Northcote which assembled in the Whitehall Rooms did not demand the nationalization of the land and all the means of production, transport, and distribution of the necessaries of life; but it gaily passed resolutions in regard to the reform of Private Bill procedure, the institution of an official search at the Patent Office, and other matters which would not have secured the support of people who knew what they were talking about. One of the chief functions of the Association is to dine, however; and at the annual dinner various notables are prevailed upon to hold forth upon the tempting subject of the condition and prospects of commerce. The "lions" at the banquet this year included the

President of the Board of Trade, who talked at large, as was expected of him, about the importance of "maintaining "the supremacy of our commercial interests." He declared himself not to be "one of those who was (?) prepared "to weep and wail over the progress of foreign countries. "He thought they should welcome the fact that other "countries were developing their resources. But we "should be extremely careful we were not left behind in "the race, and, though in that matter the Government "might render some little assistance, it rested with the "energy and enterprise of our own manufacturers to "enable us to compete successfully with foreign countries "in foreign markets." But what about the competition that foreigners bring to bear at home? Is it of good or evil import that English Gas Companies, for instance, can nowadays purchase foreign-made gas-mains and other castings at greater advantage than home-made articles? What have the Associated Chambers of Commerce to say to such signs of the times as these? It would appear to an outsider, at any rate, that their members would be much more profitably employed in investigating concrete facts of international trade, than in debating problems of legislative and administrative reform.

Sir Vivian Majendie on the Petroleum Trade.

THE Petroleum Committee has been reappointed for the present session of Parliament, and inaugurated its work for the year by hearing Sir V. Majendie on the result of the investigation, so far as it has gone. From the point of view taken by Sir V. Majendie, the evidence received by the Committee raises questions that fall mainly under two heads—the lamps and the oil. This is unquestionably the common-sense way of "envisaging" the subject. The first question asked by Sir Vivian refers to the lamps. He wonders whether the number of lamp accidents is large enough to call for legislative interference. There are no available statistics for the guidance of the Committee on this point; but still the evidence laid before them showed that there is an opening for remedial legislation in regard to lamps as well as the oil for burning in them. In recognizing this point, Sir V. Majendie showed himself superior to the somewhat clap-trap policy adopted by the London County Council at the instance of Mr. Alfred Spencer, the Chief of their Public Control Department. One of the last acts of the old Council was to endorse the recommendation that the flash-point of all burning oil should be raised to 105° Fahr. It was recognized that the construction of lamps might have something to do with the safe use of the oil; but the difficulty of applying statutory regulations to the manufacture of these appliances was felt to be so great that the Council preferred to fall back upon the regulation of the oil alone. It was held, in short, that if the oil itself were made "safe" by raising the flash-point, the consideration of the construction of the lamps might be left over. People who did not happen to be obsessed with the idea of the turpitude of the Standard Oil Company of America in "forcing low-flash oil" upon us, did not agree with this one-sided view of the subject. There is an enormous quantity of oil brought into this country, for instance, which never goes into lamps at all; and we have been unable to accept the proposition that the oil trade should be made to suffer—possibly to no real purpose—because a few persons preferred cheap and bad lamps to better articles costing a few pence more.

Sir V. Majendie drops upon this consideration with much weight. He shows that nobody has argued in favour of raising the flash-point as a necessity in regard to the safe transport and storage of oil, as distinguished from its use in lamps. If low-flash oil is to be admitted into the market at all, it will be futile to legislate against its use in lamps. "Low-flash mineral oil would always be indispensable for "certain trade purposes. In the County of London last "year there were 35 distinct industries in which the use "of petroleum, such as the Act applied to, was required." This is the point which the low-flash enthusiasts ignore. The existing flash-point was adopted for the purpose of classification, and nothing else. It was never intended to mean that all oil that satisfied the statutory requirement was to be regarded as "safe" in all circumstances, while all other oil or spirit was necessarily dangerous. A notable illustration of this mistaken view of the flash-point was given in the course of the evidence taken by the Committee. Fifteen years ago the household use of benzoline sponge lamps was common. The spirit burnt in them was admittedly dangerous; but very few accidents resulted from their use. Nowadays such lamps are rarely seen, owing to the discouragement put upon the sale of benzoline by statutory regulations in the interest of public safety. People carry about their petroleum lamps instead—and occasionally with disastrous results.

Consequently, Sir V. Majendie declares that "the statu-"tory prohibition of the sale of oil for illuminating purposes "below a certain flash-point would paralyze all invention "in the way of enabling oil below that point to be burnt "with safety; and if this prohibition were adopted as the "solution of the lamp-accident difficulty, a popular idea "would prevail that with high-test oil all danger was "obviated, and that care and intelligence in the use of "lamps were unnecessary." Hence this authority concludes that, in face of all the difficulties and uncertainties of the question, the raising of the flash-point should not be adopted as a solution until some other remedial measures have been investigated. Sir V. Majendie did not think it would be at all difficult to make and enforce regulations against the vending of unsatisfactory lamps—throwing the responsibility upon the retailer. He would be no party to the stamping or passing of lamps as safe by official inspection; but he would render retailers liable for selling unsafe articles. This strikes us as the language of common sense and experience of human nature and the ways of trade. We are obviously not concerned to vindicate the cause of cheap lamp oil; but the trade in petroleum is too important to be victimized out of regard for prejudices which spring from various views of one branch of it.

WATER AND SANITARY AFFAIRS.

THE continuation of the evidence by Mr. Whitmore, M.P., before the Metropolitan Water Supply Commission last week was replete with points of interest; and the same is to be said, with equal or even greater emphasis, respecting the evidence given by the succeeding witness, Mr. G. P. Goldney, the City Remembrancer. Mr. Whitmore believed that if the Companies were amalgamated all would be well under such control as could be effected by the Local Government Board, and by the London County Council in the exercise of their existing powers. At least he would have a trial of such a system before going further in the way of purchase or statutory control. He was not satisfied as to the financial advantages of purchase by any authority, so far as the interests of the public were concerned. On the assumption that Parliament would not sanction any terms of purchase that were not just to the Water Companies, he had never been able to assure himself that purchase would be at all profitable to London. For the transaction to be profitable, he considered that the purchasing authority should, as a consequence, be found able either to reduce the charge to the consumers or to effect a saving in the general rates. Mr. Cripps thereupon remarked that whether purchase proved profitable or not would depend on the amount of the award given by the arbitrator. A vital question is thus brought to the front; all being dependent on the accuracy of Mr. Whitmore's assumption that Parliament would secure the Water Companies against injustice. Could Parliament be relied upon to do this if the terms were to be finally fixed by an arbitrator? When Lord Cross brought in his scheme of purchase, the price to be paid was clearly set forth, and Parliament became virtually the arbitrator, to the extent of deciding against the terms proposed. Mr. Whitmore's argument amounts to this—that if the Companies are fairly paid there will be no profit to benefit the public. Either, therefore, the Companies must be victimized, or there will simply be a change of masters with no benefit to anyone—supposing, indeed, that somebody, in the person of the ratepayer, is not considerably damaged.

On the question of profit, the evidence of the City Remembrancer is particularly striking. Being asked by Viscount Llandaff whether the Corporation had come to any conclusion as to the financial consequences of purchase, Mr. Goldney signified in his reply that the Corporation had been considerably assisted in arriving at a conclusion by the evidence laid before the Commission. The logical result arrived at was that, if purchase took place, the City ratepayer would have to pay a considerably increased amount of money for the water supplied to him. The present market price of the Companies' undertakings was

put by Mr. Haward at £39,615,349, and the dividends at £1,166,620. Having regard to Mr. Haward's table, it was taken broadly that the market value produced 3 per cent. to the investor, or £1,200,000. To produce this amount, £48,000,000 of 2½ per cent. Metropolitan consolidated stock would be required. These figures evidently startled the Royal Commissioners; the Chairman remarking: "You "are assuming that you give £1,200,000 in perpetuity." Mr. Goldney said that was so, and went on to observe that the vendors must get something to produce their £1,200,000 per annum; on which Mr. De Bock Porter interposed that the award would not necessarily be for this amount. The sum to be paid would be fixed by the award. Mr. Cripps followed this up by saying it had always been held by the County Council that market value—the figure with which Mr. Goldney had been dealing—was not to be admitted as the criterion of value. Mr. Goldney explained that he merely took it for the sake of argument. As he observed, he "must have some basis." The figures were framed on the assumption that the holders of loan as well as share capital would be paid in cash. Adding to the foregoing sum £50,000 as the cost of management, and £300,000 for a sixty years' sinking fund, there arose a total of £1,550,000. Comparing this with £1,166,620, specified by Mr. Haward as the total dividends and interest, it appeared that an economy of £400,000 a year in this particular must be effected before the ratepayer could get any advantage. If this economy could not be effected, the deficiency must be made good from the rates—the charge thus created in the County of London alone being covered by a rate of 3d. in the pound; but if outside areas contributed their quota, possibly a rate of 2d. in the County of London might suffice. In reply to the objection that his calculation would make the Companies a present of £8,000,000, by paying the Companies £48,000,000 in cash when the market value of their shares was something under £40,000,000, Mr. Goldney said the Companies would argue that they were entitled to receive in perpetuity at least as much as they were receiving now.

We may remark that Mr. Lass's "Analysis" shows a gross profit of £1,208,382 accruing to the Metropolitan Water Companies in 1896. Out of this there was a payment of very nearly £232,000 for interest. If the undertakings are to be purchased on such terms that the seller cannot secure this income, it is obvious that the deficiency to the seller becomes a profit to the buyer, seeing that the present income provides £232,000 for payment of interest, and £973,000 as net profit; the dividends out of this latter amount being £922,000. Enough is said to show that the terms of purchase are expected to provide something less than the £1,200,000 in perpetuity, although if anything less is provided, the shareholders must inevitably suffer loss. The sinking fund affects the prospects of the ratepayer, and the equalizing of the charges consequent on purchase entails a loss which the Corporation estimate at nearly a twopenny rate for the whole Administrative County. Thus the figures adduced both by Sir John Lubbock and Mr. Goldney show that the pecuniary results likely to ensue to the people of London from the purchase of the undertakings of the Water Companies are by no means of an encouraging nature. If we add to this the millions required for carrying out the Welsh project, we should say that the ratepayer has great reason to desire deliverance from those friends of his who talk of setting him free from the domination of the "water lords." The drift of the whole affair is well defined by Mr. Whitmore, when he says that a large number of Progressives are actuated by the idea of securing vast undertakings and managing them on Trade Union or Socialist principles. If the ratepayer chooses to fall into this trap, it is to be hoped that Parliament will exercise sufficient wisdom to save him from himself. But if the Water Companies are to be sacrificed, the event may be looked upon as the precursor of further attacks on capital and property.

The Award in the Swadlincote Gas-Works Arbitration.—Sir G. B. Bruce, the Umpire in the above arbitration, the proceedings in which were reported in the "JOURNAL" a few weeks since (pp. 295, 354), has made his award; the sum being £34,219. The works were to be transferred at midnight on the 3rd inst. All book debts are to be taken over at the usual trade discount (including the cost of collection), with allowance for bad or doubtful debts, within one month from the completion of the purchase. Any dispute arising as to the amount of this allowance is to be referred to Messrs. Alfred Lass, Wood, and Co.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 785.)

THINGS were very sensitive on the Stock Exchange last week; the situation being decidedly ticklish. At first, the tendency was rather brighter—the Spanish difficulty looking a shade easier, and the promised statement to-night in the House of Commons regarding the Far East giving some satisfaction. Relief, too, was felt when the settlement was seen to be less entangled than forebodings had threatened. Prices generally are up; but the rise was less the result of solid confidence than of market operations, especially where "bears" were caught short. And the week closed very unsettled, and with a general disinclination to deal; the bump of caution being extremely prominent. Money was naturally in good demand for Stock Exchange purposes; but the future position of the market is dependent upon circumstances not yet manifest. Gas stocks in general were only very moderately dealt in; business centring largely in Gaslights. The general tendency was not very firm, though it would be hard to say why some issues were set back. Gaslight "A" was the chief sufferer. It opened a little shaky; and after a doubtful day or two, it fairly gave way. It has had a good deal of shuttlecock treatment lately; and in the last three weeks, it has gone from 282 up to 298, and then down again to 281, which was the lowest figure marked last Saturday. A fair amount was done in the secured issues; and prices were somewhat irregular. The "K" 6 per cent. preference had the best of it, and advanced a point. South Metropolitan was only moderately dealt in; and the prices marked were not significant either way. Commercials were quite quiet and unchanged. The Suburban and Provincial Companies were not very much noticed. The only observable change was a reduction in Brentfords. The quotation of Sheffields in the official list appears to be an *erratum*. Transactions in the Continental undertakings were extremely limited; and beyond a slight reduction in Union preference, everything was steady and unchanged. The rest presented no incident; and the only movement was a fractional fall in Monte Video. Business in Water was much restricted; and almost everything was flat, except East London, which is looking forward to the improved dividend on Thursday. The weakness particularly affected the debenture stocks.

The daily operations were: Gas opened quiet on Monday; and hardly anything was touched, except Gaslight "A," which fell 1. Business was still limited, though more distributed on Tuesday. Brentford old dropped 2; and ditto new, 3. In Water, West Middlesex moved back 1. Wednesday was more active and steadier; only Monte Video falling ½. Thursday developed weakness, without any greater activity. Brentford new fell 2; and Gaslight "A," 2; but ditto "K" rose 1. There was a great relapse in Water. Chelsea receded 10½; and New River, 2. The debentures of Lambeth fell 4; New River, 3; Grand Junction, 2; and West Middlesex, 1. But East London rose 2. Friday's business was nearly all in Gaslight "A," which fell 1. The weakness increased on Saturday when Gaslight "A" receded 4; and Continental Union preference, 1. In Water, East London was 1 higher.

ELECTRIC LIGHTING MEMORANDA.

The Affairs of the Metropolitan Electric Supply Company—Mr. R. Hammond on the Cost of Electricity—Electricity to Cost ¾d. per Unit.

THE affairs of the Metropolitan Electric Supply Company, Limited—the largest of the London Electric Lighting Companies having central stations in the heart of their district—were recently disclosed in ordinary general meeting. The capital spent upon this undertaking to the end of last year was £850,831. The revenue for the year amounted to £138,267, which was an increase of 19 per cent. on the income for 1896; and the expenditure on revenue account showed an increase of 13 per cent., which together is an indication of true development. To do more trade at proportionately less cost is good business, whatever the nature of the enterprise. This prosperity has worked its natural effect; and the Directors, like wise tradesmen, have lowered the price of current as from the beginning of this year. An interesting announcement was made to the meeting which recalls the history of the London Gas Supply. This is the statement of the Chairman that the Company "had secured a most advantageous site at Willesden, on which it was intended to erect large electricity generating works, the establishment of which would relieve them of anxiety for many years." We have frequently speculated in these columns as to how long it would be before the Metropolitan Electric Lighting Companies would have to go outside the town with their works; and here it is made to appear that this Company are the first to feel the necessity. Deptford was only a few years ahead, after all. At the same time, the propriety of the low-pressure system of electrical supply, where the "lamp density" of the district warrants it, is confirmed by the statement that the Metropolitan Company, hitherto a high-pressure undertaking,

are at present engaged in altering the system to the former principle where the local conditions render it expedient. As regards the internal financial circumstances of the Company, there is some trouble in respect of the claims of the holders of founders' and ordinary shares, which is further complicated by the question of depreciation. All this, however, does not militate against the progress of the undertaking in pursuance of the Chairman's ideal of making electric lighting "less of a luxury and more of a necessity."

At a recent meeting of the Institution of Electrical Engineers, Mr. Robert Hammond read, or rather submitted, a statistical paper dealing with the cost of generating and distributing electricity. The occasion was treated as an important one by the profession; and the electrical journals have been full of the proceedings ever since. It may be acknowledged at once that everybody who is interested in the prospects of central station electricity undertakings will do well to study Mr. Hammond's compilation, and lay it aside for reference. As the author states in beginning his paper, all undertakers under the Electric Lighting Act are bound, under penalties, to file their accounts annually with the Board of Trade, and sell copies of them at their registered office to all applicants, at a price not exceeding 1s. a copy. Hitherto the Board of Trade have not published these returns; and those who wish for the information they contain must apply to the individual concerns. Some undertakers are reluctant to disclose their accounts; and Mr. Hammond seems to think the obligation to do so rather onerous. He declares, indeed, that "the existence of such data . . . is unique in the history of English industries, if not in that of the industries of the world." He goes on to surmise that "Colonel Makins, the Chairman of The Gaslight and Coke Company, would shrink from such a rigid analysis of his cost sheets as that set out in the form prescribed by the Board of Trade for electricity undertakings." We have taken an opportunity elsewhere for protesting against this imputation that the data of gas undertakings are kept more secret than those relating to statutory electricity supply. What is there that Mr. Hammond or anybody else wishes to know about the statistics of gas manufacture that is not now offered to all the world in well-known publications?

Mr. Hammond's purpose in preparing his paper was, he tells us, to elucidate the facts in regard to "the gradually decreasing cost of the production and distribution of electrical energy from central electricity supply works in the United Kingdom." This inquiry bears very intimately upon the highly important question of the price at which the unit of electricity may be expected to be sold in the principal towns of the United Kingdom in the near future. Here let us pause for a moment to shake hands, so to speak, with Mr. Hammond over his way of stating and working out the problem. Some years ago, when electrical enthusiasts were always vapouring about what electricity would do to the gas industry when current should be generated directly from carbon burnt as fuel, when Tesla or somebody else should have succeeded in improving the present incandescent electric lamp off the face of the earth—and later, when dust destructors and thermal storage were declared to contain the secret of cheap electricity for the people—we in this column upheld the thesis that none of these things mattered a jot in comparison with those plain commercial considerations which really govern the price of commodities of all kinds the world over. The scientific electricians, in short, repeated the blunder of the scientific gentlemen who forty years ago settled the Treaty of the Paris Gas Company with the Municipality. They found what the cost of gas was in Paris at that period, and thought the only prospect of reducing it lay in the discovery of improved methods of manufacture and distribution. Therefore they very wisely and properly provided that the public should have the benefit of all such improvements as and when they might arise. Not being men of business, however, these professors and doctors did not make any allowance for the influence of the growth of trade and the consequent increase of the output of the undertaking upon the cost of manufacture; and hence the actual facts of the price of gas in Paris and the profit derived from its sale stand as a monument of the foolishness of these wise men. So it is with central station electric lighting. Mr. Hammond talks of "ideals;" but they are not the old dreams of carbon batteries and wireless lamps. He deals only with such industrial and commercial data as are actually in sight. The first result of this method is to prove that "*output* is the greatest factor in the reduction of costs per unit." Of course it is; but how often, in the alleged interest of electric lighting enterprise, has this prime consideration been overlooked or denied? Next to output Mr. Hammond places the *load factor;* then come *reliability of plant, station management, efficiency of plant, efficiency of distribution,* and, lastly, *cost of fuel.* When all these factors are in accord on the basis of an annual output of 5 million units, the cost will not exceed ¾d. per unit—according to Mr. Hammond.

The Gas Undertakings Returns.—Last Tuesday the House of Commons made the usual order for the above-named returns for the year ending Dec. 31, 1897, in the case of Companies; and for the year ending March 25, 1898, in respect of Local Authorities. Last year the order was given on the 29th of July—four months later—and the returns were published on the 26th of January last.

THE IMPORTANCE OF PRESSURE IN GAS SUPPLY.

A SENSIBLE article on "London Gas: Its Supply and Quality," recently appeared in the "Builder." It bears the impress of knowledge of the subject; and offers some criticisms of the way in which gas is distributed that deserve consideration. The writer begins by remarking that few consumers of London gas are aware of the stringent manner in which the gas supplied by the London Gas Companies is daily tested on behalf of the general public by official examiners appointed by the London County Council and the Corporation of London. The testing arrangements are then mentioned in brief; and the reader is referred for fuller information to the official instructions issued by the Referees. Without stopping to discuss this part of the subject, the writer proceeds to deal with the question of the pressure of gas at the point of ignition; prefacing his somewhat detailed treatment of this matter with the sweeping statement that "the value of the gas supplied by the companies to the consumer depends very largely upon the amount of gas pressure he can obtain at the point of ignition, for upon the maintenance of a steady and efficient pressure depends the utility of the incandescent burner, the gas-fire, cooking-stove, and a large number of other gas appliances now in general use amongst consumers of all classes." Strong as the statement is, we are not prepared to contest it. We are glad, indeed, that somebody has raised the question of pressure in connection with gas distribution; for it is time that the old-established conventions in this regard were overhauled. "In the early days of gas manufacture," says the writer, "when gas was used for little else save for lighting by means of primitive flat-flame burners, and when the percentage loss of gas by leakage in the mains was more serious than at the present time, the gas pressure prescribed by Act of Parliament, of a minimum of 6-10ths between midnight and sunset, and 1 inch between sunset and midnight, was no doubt considered sufficient to meet the requirements of that period; but while strenuous efforts have been made from time to time to force the companies to supply gas of a higher illuminating power, little or nothing has been done to obtain the supply of a greater and more uniform pressure." This is the main question concerning pressure—the question of sufficiency and uniformity; and gas engineers who have not hitherto done so will be well advised to ponder it.

The critic admits that the backwardness of statutory requirements in this regard is probably partly due to the fact that gas is usually supplied at a pressure much greater than is prescribed by Act of Parliament, which is correctly stated by him for London. (Many Provincial Gas Acts require the night pressure to be 8-10ths only.) The gas pressure in London, taken at the street-lamps, rarely falls below 2 inches, and not seldom rises to nearly 3 inches. It seems to be overlooked, however, that the statutory requirement is a minimum, and is not meant to be worked to. It really signifies the datum from which the authorities are to measure any dereliction of duty on the part of the suppliers of gas. On the face of it, self-interest should be trusted to indicate to a gas company the desirability of sending out gas at sufficient pressure; and so it might in a general way. The safeguard to the statutory prescription is needed to level up the standard of performance, which might otherwise on occasion exhibit some inequalities. Statutory gas companies are bound to keep their mains charged with gas of stated quality at a minimum pressure. The prescription with regard to pressure ensures the constancy of the supply under ordinary conditions. It does not mean that the prescribed is to be regarded as the working pressure.

The writer of the article seems to think that the prescription should approximate more closely to the ascertained requirements of a district as regards pressure; and there is reason in the contention. He says: "If the standard pressure were fixed at a minimum of 1½ inches and a maximum of 2½ inches, consumers would less frequently have to complain of an insufficient supply of gas, which, as will presently be demonstrated, is ascribed by the average consumer to the supply of 'bad' gas." This is true; but from something he says elsewhere, we draw the conclusion that the writer does not quite realize what his suggestion means to the consumer. Complaining of the existing practice, he remarks: "It is, of course, possible to employ pressure [*sic*] governors; but in practice pressure governors are very apt to get out of order, and many of those in use at the present time are by no means satisfactory, even when in so-called working order. Moreover, it would surely be better to have gas supplied from a central station at a pressure of such uniformity that a governor would not be necessary, than, as at present, to have the pressure liable to such variations that every consumer who wishes to obtain the most satisfactory and economical results from his gas supply must obtain one or more governors to do so." It will not escape the technician that there is confusion here. What does the writer mean by a "pressure" governor? He seems to hint that it is, or may be, an instrument for *increasing* pressure at the point of ignition; whereas, of course, it acts in the opposite sense, and is nothing but a more or less perfect mechanical device for keeping down the pressure of the gas to that which is sufficient and suitable for the consumers' purpose. It would be impossible to realize the writer's ideal of gas "supplied from a central station at a pressure of such uniformity

that a governor [at the point of ignition] would not be necessary," because the proper pressure is different for various applications of the gas so supplied. Granted that a considerable improvement might be effected in this regard in most places; still the justification for the continued use of the consumers' governor, or more particularly of governed burners, would remain. It is, and will long continue, the fact that the majority of gas-burners in use for lighting purposes are of the open flat-flame type, with many argands. These burners do best with gas at about 5-10ths pressure; and although the incandescent burners require a little more, they are very particular about having too much, and their successful working depends upon the reliability of their governors to prevent this excess. Stoves, fires, and engines require higher pressure; but if the requirements of the two great divisions of gas-consuming appliances—the high pressure, and the low pressure—are to be satisfactorily met by one and the same distributing system, the employment of governors at the point of ignition must in the case of the apparatus in the second division become more rather than less expedient. There is no reason to complain of this conclusion; because it is not true, as the writer states, that governors are unsatisfactory appliances, very liable to get out of order. As a matter of fact, hardly any appliance employed in the whole range of gas engineering is so good in its way as are governors. We write in the plural because, of course, there are governors of all kinds and descriptions, from the governor that enables a cylinder of compressed gas to discharge gradually at any desired rate, to the governor of a street-lamp. It is the governor that makes railway carriage lighting by gas possible.

To fall back, however, upon the major contention that the ordinary statutory gas pressure is insufficient to meet modern requirements, our critic asks: "Why should gas companies have a legal right to supply all gas manufactured by them at a pressure below that necessary to meet the common requirements of consumers?" As he had just remarked that the gas companies do, in point of fact, keep gas in their mains at pressures varying from 1·2 to 3 inches, because such a pressure is found necessary in practice, the point of the statutory prescription appears to sink into comparative insignificance. It may be conceded, however, that the fluctuation of gas pressure between the limits stated is a defect that calls for such remedy as may be possible in the circumstances. Gas engineers generally have not paid sufficient attention to this matter. They know, better than their critics, that great improvements have been effected in the material and practice of gas distribution since the statutory prescription of the minimum amount of pressure in the mains was formulated. They have learnt to look from a fresh standpoint at the old bugbear of unaccounted-for gas. Not so long ago, a positive, but uncertain, amount of leakage from mains and services was accepted as inevitable, even with the best-regulated gas undertaking; and the gas manager had a horror of high-pressure distribution as naturally tending to increase this waste of gas. Now the necessity of any leakage whatever from distributing plant is denied. There are many miles of modern mains, both trunk and district, and services in connection with them, which do not leak at all. Where this standard of staunchness is realized, the necessity of doubling the statutory pressure for the sake of the high-pressure order of consumers' apparatus has no terrors for the gas manager. And if high pressure does mean a little more gas unaccounted for, in various ways—well, the progressive gas manager is not afraid of it.

What gas managers have perhaps failed to realize in this regard is that all this material improvement in distribution makes it incumbent upon those responsible for the service to increase its efficiency in other respects than that of reducing leakage. Reliable mechanical appliances are at the command of the distributor of gas for keeping up the supply at a determined pressure, and equalizing the pressure in different parts of the district. Much ingenuity has been expended by accomplished mechanicians in dealing with the practical problems of gas distribution; but they have not received the attention and patronage merited by their qualities and the requirements of the consumers. More enterprise would be shown in the same direction if there were a better prospect of its being recompensed. The fact is, however, that a very low standard of efficiency in distribution satisfies many gas managers who have not yet risen to the conception of what is due to the public in this regard. It is not to be supposed that perfect uniformity of pressure throughout a district is attainable. At the same time, it is unquestionably possible to get very much closer to this ideal than is usually attempted. The reward of success in this way of improvement consists in the better working of every kind of gas apparatus, and consequent immunity from complaints of "bad gas." Gas managers laugh at consumers for complaining of "bad gas" when the trouble has nothing to do with the illuminating power. But pressure is as important a function of a good gas supply as illuminating quality; and where the consumer does not get enough gas—through no fault of his own—the supplier is as much to blame as he would be if what he sent out was deficient in candle power. It is a well-known thing that where people can get plenty of gas they rarely complain of its quality. The writer in the "Builder" has done good service by laying stress upon the importance of pressure in a gas supply. The remainder of his article is devoid of suggestion.

THE GAS REFEREES' SULPHUR TEST.

THE method of estimating the "sulphur compounds other than sulphuretted hydrogen" in coal gas, prescribed by the Metropolitan Gas Referees, has often met with rather adverse criticism at the hands of chemists. Generally speaking, the critics have confined their aspersions to disquisitions based on more or less substantial theoretical considerations of the occurrences in the special apparatus used for the combustion of the gas, and the condensation of the products of the combustion. They may have used the apparatus a few times; but as often as not the improvements they formulate are conceived in ignorance of the actual working of the Referees' method.

The latest of the critics of this stamp is Signor Antonio Longi, who has described his modification of the method in a recent number of the "Gazzetta Chimica Italiana;" and an abstract translation of the descriptive and analytical matter in his paper is given in another column. (See p. 768.) Signor Longi, however, displays more candour than many of those who have fathered "improved" methods for the estimation of sulphur in coal gas. He admits that the chief reason why he was not content to use the well-known Drehschmidt system, which may be regarded as a simple adaptation of the Referees' method to German conditions, was that he had not at hand the necessary apparatus. This confession of the guileless Italian chemist strikes the key-note of most of the dissatisfaction with the Referees' system. The necessary apparatus for the sulphur test forms, in its entirety, an expensive item in the equipment of a laboratory. It is seldom purchased for use in general technical laboratories; and when perchance a chemist in one of these is called upon to make an estimation of the sulphur in gas, he fits up, with the apparatus at his command, an arrangement which bears some resemblance to that prescribed by the Referees. If his makeshift fails to give satisfaction, he forthwith condemns the Referees' method as untrustworthy.

Signor Longi has chosen the better course of devising a plan which possesses the merit of some degree of originality, and of checking its accuracy by tests on a synthetically prepared gas. He does not, however, refrain from criticism of the Referees' and other methods, though he has had no practical experience of them. In so far as such academical criticism can be of any worth, his comments on existing methods are good; but his general review of the sulphur question cannot be accorded equal commendation. His reading appears to have been varied; but the quotations he makes indicate that his selection is peculiar or his judgment faulty. We learn with some surprise that as much as 87 grains of sulphur have frequently been found in 100 cubic feet of London gas. But astonishment diminishes when we notice that the authority for this statement is Dr. Georg Thenius, who is the author of a number of handbooks belonging to a well-known German technical library series. His treatise on gas manufacture is by no means one of the best in the series; but it is only fair to add that Signor Longi misquotes his authority to the extent of about 4 grains, as Dr. Thenius only credits London gas with 83 grains of sulphur per 100 cubic feet. We are glad to observe that other places are supplied with less impure gas. The following figures show the *maximum* number of grains of sulphur in 100 cubic feet of the gas supplied to certain towns during the years mentioned; and they are quoted from various sources by Signor Longi to illustrate the variations in the amount of sulphur impurity in lighting gas. Vienna (1865-68), 6; Breslau (1883), 12·7; Cologne (1885-86), 17; Cologne (1880), 17·5; Leeds (1887), 19·7; Leipsic (1875), 22·3; London (1870), 24; Massachusetts (1885-87), 31·2; Christiana (1894), 35; Helsinfors (1894), 35·4; and Hamburg (1885-93), 61·2. Few of these figures indicate the presence of a distressingly large amount of sulphur in gas; and it needs reference to an alarmist report on Hamburg gas, compiled in 1894 by Herren Dennstedt and Ahrens, to support Signor Longi's view that the public weal demands a higher degree of purification than that of which the above figures are evidence.

The report on Hamburg gas by these two German chemists purported to prove that nearly the whole of the sulphur was converted to sulphuric acid when the gas was burned. The contention of earlier writers that the sulphur was converted directly to sulphur dioxide, which passed away unchanged from a well-ventilated apartment, was stated to have been disproved. Signor Longi accepts the views of Herren Denustedt and Ahrens; and thereupon he argues that the combustion of a cubic foot of impure gas—such as the reputed London gas containing 87 grains of sulphur per 100 cubic feet—would deposit 2·5 grains of sulphuric acid on the walls and furniture of the room. Setting aside the fact that London gas has not for years contained half this amount of sulphur, we may point out that the work of Herren Dennstedt and Ahrens has been challenged by the results obtained by Herr Collan.* These results showed that about 90 per cent. of the sulphur was converted to sulphur dioxide when the gas was burnt, and not to sulphuric acid. Signor Longi appears to have been unaware of this work of Herr Collan, which really disproves the alarmist views held by the compilers of the Hamburg report.

If we modify his computation of the injury which may be inflicted by the sulphur in gas to the extent of adopting Collan's

* See "JOURNAL," Vol. LXVI., p. 729.

results, and of taking the amount of sulphur in the gas at about 20 grains per 100 cubic feet—which is what was actually found by him in the gas supplied to Rome in October last—we find that the combustion of 1 cubic foot of gas will cause the deposit of, at the most, 0·06 grain of sulphuric acid, instead of the 2·5 grains already quoted from his paper. In plain language, the effects of the sulphur have been magnified over forty times; and a totally wrong impression of the hygienic influences of coal gas has been created in the minds of casual readers of Signor Longi's paper. The harm done by the latter will be the greater, because the so-called evidence from which the conclusions are drawn appears to be supported by a mass of references to technical literature in many tongues; and only those familiar with the subject will detect the poverty of the erudition and the fallacies of the arguments of the Signor. The sulphur question is an old one to most readers of the "JOURNAL;" but in Italy it appears still to be in its infancy. We wish, in the interests of truth and justice, that Signor Longi had translated a few paragraphs from the chapter on "The Sulphur Question" in Mr. Norton H. Humphrys' "Chemistry of Illuminating Gas" for the preamble of his paper, instead of committing himself to a host of fallacious statements on the subject.

The introduction of a new method of estimating the sulphur in gas did not need a laboured excuse, much less a tirade against the purity of our gas supplies. There is scope for a new plan such as the Signor has devised; and it was unnecessary for him to speak disparagingly of the well-established methods. The Referees' and Drehschmidt's systems were devised for explicit purposes; and it was essential that the apparatus used should be substantial and readily manipulated by persons having a modicum of chemical training. Signor Longi's apparatus is constructed almost wholly of glass—in itself a sufficient condemnation of it for the purposes for which the Referees' test is required—and is specially useful in that a fairly expert manipulator can construct it from the materials at hand in an ordinary laboratory. Herein lies its utility, which should be very great, if the Signor's testimony to the accuracy of its work be confirmed on extended trial. We hope that it may receive such a trial at the hands of some of our readers.

The aspersions frequently cast on the accuracy of the Referees' method of estimating sulphur, usually attribute to it either incomplete oxidation of the sulphur or imperfect condensation. With regard to condensation, there does occasionally seem ground for dissatisfaction with the apparatus. But if a second condensing cylinder be connected to the outlet of the one used in the officially-prescribed apparatus, and the glass chimney be fitted above the second cylinder, and the condensed liquid and washings from the *two* cylinders and trumpet tube be used for the determination of the sulphate therein, the results will usually agree with those obtained by the use of the apparatus with one condensing cylinder, as prescribed by the Referees. In some instances, a slightly higher result may be obtained; but the difference will not be considerable. It will, however, tend to be greater under the amended "Instructions" recently issued by the Referees (see *ante*, p. 529); for the extra heat and increased volume of products of combustion per unit of time from a flame consuming two-thirds of a cubic foot of gas per hour, will throw an increased burden on condensing apparatus designed to cope with the heat and products from a flame consuming only half a cubic foot of gas per hour. We presume this point has met with due consideration at the hands of the Referees. It would certainly seem desirable now to lengthen the condensing cylinder in order to retain under the altered conditions the former efficiency of condensation. Until the advent of the amendment, we were certainly prepared to maintain that adequate condensation was secured in the Referees' apparatus, when used strictly in accordance with their "Instructions;" and we think that Signor Longi could not have failed to bear us out, if he had actually tried the apparatus.

With regard to the alleged incompleteness of the oxidation of sulphur in the Referees' apparatus, the charge is also for the most part groundless. The gas is burnt in a small bunsen flame, which should be non-luminous; and the burner-nozzle must be modified if the flame is luminous. If attention is given to the burner, as the Referees' "Instructions" direct, in order to obtain a perfectly non-luminous flame, the products of combustion must be as nearly as possible in the highest state of oxidation. If by chance some sulphur is imperfectly oxidized in the flame—that is to say, if it is converted to sulphur dioxide only—ammonium sulphite would apparently be formed; but in the alkaline liquid from the condensing cylinder, this would almost certainly be oxidized to sulphate. If there is any doubt on the point, a few drops of bromine water may be added to the liquid, and the surplus bromine driven off by warming, before the precipitation with barium chloride is made. This very slight modification of the Referees' "Instructions" may be followed, in all dubious cases, by analysts who are not bound in duty to follow implicitly these "Instructions;" but it will be found, as a rule, that the result is no higher than when the treatment with bromine is omitted. The use of nitric acid and barium nitrate, in place of hydrochloric acid and barium chloride, has been recommended by some; but it should not be adopted by any who are not expert analysts, as special care is necessary to secure accurate results. It cannot, however, be regarded as proved that any appreciable amount of sulphur escapes estimation by the Referees' method, when the official "Instructions" are implicitly followed. Tangible objections to the system are that it is tedious, and requires a rather expensive equipment; but these are of small moment in the case of official testing-stations, where a special operator is employed to carry out daily tests, and must be waived in favour of the many practical advantages the method affords. The systems of estimation in which hydrogen peroxide is employed, are open to several serious objections; and like nearly all methods excepting that of the Referees, they are liable to serious error if the gas contains any ammonia.

It may perhaps be pertinent to observe that the recent amendment to the Referees' "Instructions" reduces the period of combustion of the statutory 10 cubic feet of gas from twenty to "not less than" fifteen hours, and that consequently the sesquicarbonate of ammonia at the base of the trumpet will now be less exhausted than formerly at the end of the testing period. This will be considered by many a distinct improvement incidentally introduced by the recent amendment.

OBITUARY.

Mr. THOMAS RIGBY, Manager of the Bury Corporation Water-Works, died on Monday last week, in his fifty-fifth year. The deceased had been in failing health for some months; and indeed had been unable to attend the office since August last. Mr. Rigby's connection with the water supply of the town dates from 1867, in July of which year he became collector to the then Water Company. His progress was rapid. In three months, he was made Chief Clerk; and in the following March, he was appointed Manager, in which capacity he was retained when the Improvement Commissioners purchased the works in 1872. From that time, under the Commissioners and the Corporation, he continued to discharge the duties of the office until laid aside by his last illness. When Mr. Rigby became Manager in 1868, the revenue of the water-works was £13,535; and the number of houses supplied was 15,466. At the present time the number of houses in the area of supply is 31,500; and the revenue, £37,966. Among his subordinates the deceased was always popular; and two or three years ago, a number of the officials presented him with a gold watch as a token of their appreciation of his conduct as the head of the department. In the district, Mr. Rigby was a prominent Freemason.

PERSONAL.

The signature of Mr. TORRENS JOHNSTON appeared on the Stock Exchange notices issued on Monday last week, in place of that of Sir Henry Burdett, K.C.B.

Mr. F. LEE, the Secretary and Gas Manager of the Marsden District Council, has been selected by the Hinckley District Council to fill the position recently vacated by Mr. G. Helps.

The will of Mr. W. H. WYATT, the Governor of the Chelsea Water Company, whose death was announced in the "JOURNAL" for Jan. 11 last, has been proved. Deceased left personal estate of the value of £88,927.

We have already announced the appointment of Mr. T. H. Duxbury, the Assistant-Manager of the Bradford Road Gas-Works, Manchester, to a similar position at Bradford. He is to be succeeded by Mr. J. S. NAYLOR, who has for the past four years had the supervision of the Droylsden station.

Last Thursday Alderman J. ANNAN, whose resignation of the position of Engineer and Manager of the Wolverhampton Gas Company was recently announced, was presented by the officials with a silver salver and tea and coffee service, and with an illuminated address and silver basket and toast-rack by the workmen.

The Council of the Institute of Secretaries have elected Mr. J. T. DENNISTON, Secretary of the Mexican Railway Company, Limited, as President for the ensuing year; Mr. A. DICKSON, Secretary of the Kent Water-Works Company, and Mr. A. H. CANE, Secretary of the Reading Gas Company, being chosen as Vice-Presidents.

Mr. T. S. CLEMINSHAW, Assoc.M.Inst.C.E., has been appointed Manager of the Colombo Gas and Water Company, Limited, for which position applications were recently invited in the "JOURNAL." Some years ago Mr. Cleminshaw was Manager of the gas-works at Christchurch, New Zealand; but from 1884 till about this time last year, he filled the position of Engineer to the Launceston (Tasmania) Gas Company. Mr. Cleminshaw is a member of The Gas Institute; and it may be remembered that he contributed a paper on "Gaseous Fuel in the Retort-House" at the meeting held in London in 1894.

The "Richmond" Cookery-Book.—A short time ago we noticed that Messrs. Richmond and Co., Limited, had published at 2s., a useful little cookery-book compiled by Miss Lillie Richmond. It met with such success that they have issued a cheaper edition, by Miss Florence Surridge, at one-fourth of the price. The authoress acknowledges that a number of her recipes have been taken from the larger work; but she has given many which she has been in the habit of using in her cookery lectures. Blank paper is inserted for additions; and there is an index.

NOTES.

Compressed Air and Oil Explosions.

Some remarkable explosions due to the action of compressed air upon lubricating oil have been described in the "American Machinist." Explosions of air-compressors suspected to contain some vapour of lubricating oil have been recorded in Germany. In the American case there were three explosions in connection with the same air-compressing plant; two of them taking place under conditions that prevented exact observation of the circumstances. In the third case, explosion occurred in a length of horizontal pipe with a short vertical rise at each end; the whole forming a portion of the connection between a reservoir of compressed air at 1700 lbs. per square inch, and a point of utilization. This arrangement of the piping formed a sort of trap for any liquid; and when the valve at the end nearest the reservoir of air was suddenly opened, admitting the full pressure to the pipe, a frightful explosion instantly followed. The explosion was accompanied by a great outburst of flames. This, and the presence of soot on the ruptured portion of the pipe, explained what had happened. There was some oil and also air, at atmospheric pressure, in the trapped length of pipe. The sudden opening of the valve let the compressed air into this pipe with a rush. It stirred up the contents of the pipe, and—another valve farther on being closed—the air was so suddenly and violently compressed that a high temperature was developed, which caused the oil to flash into vapour, and form an explosive mixture with the same air that was forthwith ignited. The explanation is quite clear; but it reveals a concatenation of conditions the existence of which would hardly have been foreseen.

The Bye-Products of Blast Furnace Gases.

Mr. A. Humboldt Sexton has described in the "Engineering Magazine" the system of recovering the bye-products of blast-furnaces, when the fuel used is bituminous coal, as in Scotland. Ordinary Scotch splint coal, such as is used in the local blast-furnaces, yields only about 60 per cent. of coke, or even less; and since the fixed carbon is the only constituent of the coal which is of any use in the blast-furnace, a large quantity of coal is consumed for the iron produced. The coal contains about 1·4 per cent. of nitrogen; and if the whole of this were produced as ammonia, there would be a yield of about 143 lbs. of sulphate of ammonia for every ton of coal consumed. In practice only about 10 per cent. of the nitrogen appears as ammonia; so that the yield of sulphate is only from 22 to 26 lbs. per ton of coal used. In 1879, Messrs. Alexander and M'Cosh, of Gartsherrie, determined to treat their blast-furnace gases for the recovery of the tar as well as the sulphate; and they were followed in this enterprise by Messrs. Dempster and Mr. Gillespie. There has been a question as between "washing" and "scrubbing" the gas. Mr. Sexton remarks that "at first sight it seems that washing—*i.e.*, bubbling the gas through water—should be more efficacious in removing matters in suspension than scrubbing it with a shower of descending water; but, as a rule, this has not been found to be the case. When gas bubbles through water, only the surface of the bubble comes in contact with the water, and therefore solid or liquid matter may be carried through untouched. If the gas could be broken up into bubbles small enough, washing could be made quite as effective as scrubbing." The purified blast-furnace gas is suitable for use in gas-engines for the production of motive power. The tar from blast-furnace gas is entirely different from coal tar. It is capable, however, of being distilled into oil suitable for burning in Lucigen lamps, and creosote oil and pitch.

Cause of Unpleasant Odours from Surface Waters.

In a recent number of "Nature," a brief account was given of some experiments conducted by Messrs. Jackson and Ellms, and described in an article in the "Technology Quarterly," of Massachusetts, which throw a little light on the above subject. It is well known that one of the difficulties which water-works engineers have to contend with is the unpleasant odour which sometimes characterizes surface waters stored in open reservoirs. Such odours are frequently supposed to be due to the decomposition of organic matter in the water. Though this may be the case, in many instances they have been found to be attributable to the growth of microscopical organisms; and quite a long list has now been furnished of vegetable growths which impart disagreeable tastes and smells to water. The investigations of the above-named gentlemen were made upon one of the *Cyanophyceæ*, or blue-green *algæ*, which, when growing in water, impregnates the latter with a most unpleasant mouldy grassy smell. Pure cultures of *Anabæna circinalis*—an important offender in this particular—were obtained; and numerous experiments were carried out. As in the case of other microscopical water organisms, the odour emitted during growth was found to be due to the presence of certain compounds, of the nature of essential oils, which make their appearance at a particular stage. The investigation was extended to an examination of these *Anabæna* in process of decay—a most offensive odour being given off during decomposition. This the writers think is probably due to the high percentages of nitrogen which these growths contain. The gas given off during decomposition was analyzed, and was found to contain a large percentage of hydrogen and a considerable proportion of sulphur compounds. Analyses of the decayed gelatinous material resulting from the decomposition of *Anabæna* revealed the presence of a large amount of sulphur and a considerable amount of phosphorus. The writer of the notice in "Nature" says the subject is of such importance in connection with the storage of surface waters, that the closer study of the chemical composition of these organisms and of the organic and mineral contents of the waters which the various genera infest, is well worthy of attention; for by extending our knowledge in this manner, we should be better able to judge beforehand as to the likelihood of particular waters becoming subject to these unpleasant changes on storage.

The Proper Proportion of Moisture in Air.

An interesting paper on the influence of moisture in artificially heated air was read by Dr. Henry Barnes before the American Public Health Association. The author stated that when the mean relative humidity of the atmosphere lies between 60 and 70 per cent., according to the well-known meteorological scale in which zero stands for entire absence of moisture and 100 corresponds to complete saturation, the condition is better adapted for comfort and health than either a higher or a lower degree of humidity. If such a condition could be maintained indoors during the winter, it would be much better than the usual American practice of supplying large volumes of hot dry air, or the presence in rooms of extensive surfaces of heated metal. From a number of tests of the air in various buildings heated by steam, hot air, and hot water, the mean relative humidity was found to be only 31 per cent., while at the same time that of the outside air averaged more than 70 per cent.; this difference being due to the fact that no attempt had been made to qualify the stove heat by adding the amount of moisture required to maintain the relative humidity at the higher temperature. In such dry air the wet-bulb thermometer marks a temperature 20° lower than the dry-bulb; which shows the rapidity with which the atmosphere will absorb the moisture from the surface of the human body, consequently lowering the sensible temperature. This accounts for the chilly sensation experienced from the slightest draught in the hot dry air of many interiors. Where the proper relative degree of humidity is preserved in the air, a decided feeling of comfort is diffused; and much of the illness which is usually prevalent in the winter, especially colds, coughs, and throat troubles, is at the same time avoided.

COMMUNICATED ARTICLE.

THE CHEMISTRY OF GAS MAKING.

A CHAPTER FOR STUDENTS.

By G. E. Brown, F.I.C., F.C.S.

The chemistry of the processes involved in gas making is no doubt the most difficult part of the subject to the average student of gas manufacture, who is usually an engineer rather than a chemist, and whose knowledge of chemical matters is generally no better or worse than a chemist's command of engineering *technique*. The present article is therefore written not as contributing anything fresh to the chemistry of gas manufacture, but as a help to those students who may wish to gain an all-round knowledge of their subject for examination purposes or otherwise.

The chemistry of gas making divides itself naturally into (1) chemical processes involved in the destructive distillation of coal or other material, and (2) those concerned with various methods of purifying crude gas. Treating the subject in this way, we have first to say that the chemical changes taking place in the carbonization of coal constitute one of the least understood processes connected with gas making. Coal is a highly complex body. Its ultimate composition can be expressed simply enough—that is to say, we can express its composition in percentages of carbon, oxygen, hydrogen, nitrogen, sulphur, and ash, as is done in the numerous published analyses of the mineral. But this is a very different, and a much easier thing than expressing its proximate composition—*i.e.*, saying into what combinations these percentages of the various elements are grouped. Of this, we have but little definite knowledge; and hence it is difficult to trace the changes which are produced when coal is heated in closed vessels. Still certain facts with regard to its destructive distillation have been ascertained and are important. In the first place, coal contains certain hydrocarbons—compounds containing carbon and hydrogen only—some of which are probably hydrocarbons of the paraffin series, of which marsh gas, or methane (CH_4) is the first member. All the members of this series correspond to the general formula, C_nH_{2n+2}. Thus the first three members—the methane, ethane, and propane—have respectively the formulæ CH_4, C_2H_6, C_3H_8. When members of this paraffin series are heated, they give rise to a lower member of their own and to hydrocarbons of another series—the olefines—of which ethylene (C_2H_4) is the representative compound. Then the hydrocarbons of the last-named series give rise when heated to lower members thereof and to members of the acetylene series, of which acetylene (C_2H_2) is the simplest

representative. The action of heat, however, on acetylene is of a different character to that on the paraffins and olefines. On the former the action of heat is analytic—*i.e.*, destructive—tending to reduce the compounds to simpler hydrocarbons. With acetylene its action is synthetic—*i.e.*, constructive—giving rise to compounds of more complex composition. Acetylene at a red heat is converted into benzene, a hydrocarbon of an altogether higher order of complexity—$3\ C_2H_2 = C_6H_6$.

Hence a little reflection will show that these reactions amply account for the presence in coal gas of methane, ethylene, hydrogen, &c., constituents produced by analytic processes, and of benzene, toluene, &c., bodies owing their existence to synthetic changes. It should further be noted that, when high heats are employed during distillation, the yield of benzene increases; the tars produced at temperatures ranging from about 1700° to 2000° Fahr. being richer in benzenoid hydrocarbons than those obtained at lower temperatures (800° Fahr.), in which paraffin and olefine hydrocarbons predominate. This is a natural result of the fact that the formation of benzene goes on at a much higher temperature than that required to give rise to paraffin and olefine hydrocarbons.

The influence of the oxygen, sulphur, and nitrogen contained in coal must also be considered. The oxygen is mostly finally converted into carbon dioxide (CO_2) and carbonic oxide (CO); and the higher the temperature of distillation, the larger is the proportion of these bodies, since their formation takes place at the expense of oxygenated bodies, like phenol, in the tar. Nitrogen, which occurs in coal in comparatively small proportion, is distributed in various ways among the products of distillation. The late Professor William Foster stated that 14·5 per cent. of it is evolved as ammonia, 1·56 per cent. as cyanogen, 46·7 per cent. remains in the coke, while the remaining 35·3 per cent. is found in the gas and tar. Here again increase of temperature during distillation has its effect. Ammonia is decomposed at a red heat, though very slowly, when mixed with other gases (Ramsay); but when brought into contact with red-hot coal it forms ammonium cyanide and hydrogen—

$$2\ NH_3 + C = NH_4CN + H_2$$

Hence ammonia rises to a maximum at a moderate temperature (one giving about 9500 cubic feet of gas per ton of coal); while the production of cyanides is greater with higher heats.

Some of the sulphur in coal exists as sulphate of lime, which remains in the coke. The greater proportion, however, exists as pyrites, or as an organic sulphur compound, and on distillation it is mostly converted into hydrogen sulphide (H_2S). Carbon bisulphide is also formed; its production being no doubt due to the direct action of the sulphur vapour liberated from the pyrites on the red-hot coke. When the pyrites in the centre of the charge is hot enough to yield sulphur vapour, the outer surface of the partly coked mass has acquired a temperature high enough to form carbon bisulphide with it.

Passing now to the chemistry of purification, the principal reagents are, of course, bog oxide, Weldon mud, slaked lime, and sulphided lime. The two former remove hydrogen sulphide only. The active agent in bog oxide is hydrated ferric oxide ($Fe_2O_3 \cdot H_2O$), of which a good sample contains about 32 per cent. But only about two-thirds of this is active towards hydrogen sulphide. The reaction between the oxide and sulphide is represented by the following equations:—

$$(a)\ Fe_2O_3 \cdot H_2O + 3\ H_2S = Fe_2S_3 + 4\ H_2O$$
$$(b)\ Fe_2O_3 \cdot H_2O + 3\ H_2S = 2\ FeS + S + 4\ H_2O$$

Equation (*a*) is the predominant reaction. When the oxide is revivified by exposure to air, the sulphides of iron are converted into the corresponding oxides, with liberation of sulphur; thus—

$$(a)\ Fe_2S_3 + 3\ O = Fe_2O_3 + 3\ S$$
$$(b)\ FeS + O = FeO + S$$

The ferrous oxide in the latter reaction rapidly changes by absorption of oxygen into ferric oxide.

Weldon mud contains about 25 per cent. of manganese dioxide (MnO_2) in the sample as used. With hydrogen sulphide it forms the flesh-coloured manganese sulphide, which on exposure to air is rapidly oxidized, with a resulting deposition of sulphur.

Slaked lime, or calcium hydrate—Ca(OH)(OH)—takes up both carbon dioxide and hydrogen sulphide. With the former it produces carbonate of lime—

$$Ca(OH)(OH) + CO_2 = CaCO_3 + H_2O.$$

With the latter it forms calcium hydroxy-hydrosulphide and also calcium hydrosulphide—

$$Ca(OH)(OH) + H_2S = \underset{\text{Calcium hydroxy-hydrosulphide.}}{Ca(HS)(OH)} + H_2O$$

$$Ca(OH)(OH + 2\ H_2S = \underset{\text{Calcium hydrosulphide.}}{Ca(HS)(HS)} + 2\ H_2O$$

Carbon dioxide turns the hydrogen sulphide out of both of these compounds, thus—

$$Ca(HS)(HS) + CO_2 + H_2O = CaCO_3 + 2\ H_2S$$

This reaction is, however, never quite complete—that is to say, a lime purifier which has been exposed to both carbon dioxide and hydrogen sulphide will not lose all the latter, even if subjected to pure carbon dioxide. This results from the fact that a reverse reaction is possible—and, indeed, takes place in dilute solutions—whereby hydrogen sulphide attacks carbonate of lime, thus—

$$CaCO_3 + 2\ H_2S = Ca(HS)_2 + CO_2 + H_2O$$

These changes, which go on in ordinary lime purification, are best borne in mind by representing them diagrammatically—a method first used, the writer believes, by Mr. Leicester Greville. Diagram 1 shows the state of things in a four-tiered purifier which has been exposed for a short time to gas containing carbon dioxide and hydrogen sulphide. Diagram 2 represents the state of a similar purifier which is retaining carbon dioxide but allowing hydrogen sulphide to pass by reason of the decomposition of the hydroxy-hydrosulphide by the carbon dioxide.

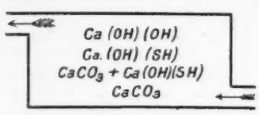


DIAGRAM 1.

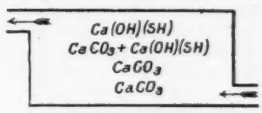


DIAGRAM 2.

Inlet.—Gas containing $CO_2 + H_2S$. *Outlet.*—Gas containing no CO_2 or H_2S.

Inlet.—Gas containing $CO_2 + H_2S$. *Outlet.*—Gas containing H_2S only.

The composition of sulphided lime, used for the absorption of carbon bisulphide, has long formed the subject of controversy. The most accurate knowledge we possess on the subject we owe to Veley, according to whom the true absorbent of carbon bisulphide is not calcium sulphide, CaS, or calcium hydrosulphide, Ca [HS][HS], but calcium hydroxy-hydrosulphide, Ca[SH][OH]—a sparingly soluble white body obtained by passing any inert gas such as hydrogen or nitrogen into a solution of the hydrosulphide. The hydrosulphide is itself produced by the action of hydrogen sulphide on milk of lime; its formation being favoured by decreased temperature. It is readily convertible into the hydroxy compound by mere exposure to air, the change taking place with evolution of heat and disengagement of hydrogen sulphide. When carbon bisulphide is absorbed by sulphided lime, the compound formed consists of a basic calcium thio-carbonate—$2\ Ca(OH)_2 \cdot CaCS_3 \cdot 10H_2O$—which forms yellow crystals, dissolving to a red liquid. These researches of Veley explain the hitherto inexplicable inactivity of over-fouled lime boxes, or of boxes fouled at low temperatures. In either case, the hydroxy-hydrosulphide has been converted into hydrosulphide. Air regenerates the hydroxy-hydrosulphide, or if the mass is broken up, the unaltered lime combines with and removes the hydrogen sulphide present in excess. Viewed in the light of Veley's work, the difficulties experienced by engineers with sulphided boxes become explicable. The following passage is an example of such difficulties; and by reference to what has been said, the student will be able to trace the chemical changes concerned: "When lime is sulphided in very cold weather, it absorbs an extremely large quantity of hydrogen sulphide without acquiring energetic affinity for 'sulphur' (*i.e.*, carbon bisulphide). It has all the appearance of fresh virgin lime; being cold, white, dry, and powerless to arrest sulphur. By exposure to the air it becomes dark green, moist, steaming, giving off hydrogen sulphide abundantly, and acting vigorously on 'sulphur.'"

North of England Association of Gas Managers.—We learn from the Hon. Secretary of this Association (Mr. J. H. Penney, of South Shields) that the forty-second half-yearly meeting will be held at the Gas Offices, Newcastle-upon-Tyne, on the 30th inst., under the presidency of Mr. J. Holliday, of Scarborough. Mr. D. Terrace, of Middlesbrough, is to read a paper on "The Adoption of Carburetted Water Gas;" and Mr. C. Dru Drury, the Manager of the Hendon works of the Sunderland Gas Company, will deal with the subject of "Economical Methods of Raising Steam on Gas-Works." The members will, as usual, dine together after the business.

British Association of Water-Works Engineers.—The annual meeting of this Association will be held at Southampton on the 24th prox. and the three following days. The proceedings will be opened by the Mayor (Alderman Tilling, J.P.) welcoming the Association to the town; and after the preliminary business has been transacted, the members will partake of luncheon at his invitation. Business will occupy the afternoon of the first, and the mornings of the second and third days; the afternoons being devoted to visits to the South Hants and the Southampton Water-Works. On the last day there will be an excursion to Portsmouth and Gosport, where the water-works will be inspected. The annual dinner will take place on the evening of the 25th.

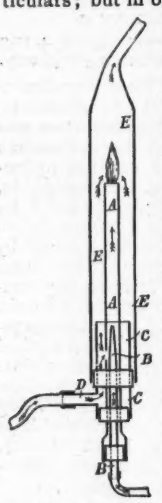
The Welsbach Patent Rights in Germany.—The Supreme Court of Judicature in Berlin gave its decision a few days ago in a number of actions brought by the German Incandescent Gas-Light Company against various competitors for alleged infringement of the Company's patent rights in regard both to burners and mantles. The decision was awaited with great suspense, owing to the magnitude of the interests involved; and the Court was crowded when judgment was given. The actions failed; and costs were granted against the plaintiff Company. Notice of appeal was given; but it appears to be generally considered in Germany that the monopoly of the German Incandescent Gas-Light Company has been abolished by this decision of the Supreme Court.

TECHNICAL RECORD.

A NEW METHOD FOR THE DETERMINATION OF SULPHUR IN GAS.

Signor Antonio Longi, of Rome, has devised a method of estimating the sulphur in illuminating gas, and described it in the "Gazzetta Chemica Italiana" for February last. We are referring to the critical portion of the paper on another page, and therefore give here a brief description of the method and the apparatus required.

The gas on which the estimation is to be made is passed through an experimental meter, to a bunsen burner of special construction. No illustration of the burner or apparatus is given in the Italian journal from which we take these particulars; but in order to facilitate description, we have made the annexed drawing of the combustion apparatus from the dimensions given by Signor Longi. The bunsen burner is formed of a glass tube A, from 6 to 6·5 mm. (0·25 inch) in diameter internally. The internal air supply is admitted to this tube through a circular orifice 6 to 6·5 mm. (0·25 inch) in diameter, at a distance of 100 to 110 mm. (3·9 to 4·3 inches) from the top of the tube. The bottom of the tube A is fused to a wider glass tube, which accommodates a cork, through which passes up into the tube A to a height of 10 to 20 mm. (0·4 to 0·8 inch) above the air-admission orifice the gas-inlet tube B, which is drawn out at its upper end to an orifice of about 0·8 to 1 mm. (0·035 inch) in diameter. The burner-tube A is then inserted, by means of a perforated cork, into a glass tube C, about 18 mm. (0·7 inch) in diameter. The tube C has fused to it a branch tube D, about 7 mm. (0·27 inch) in diameter internally. The air required for combustion passes in through the tube D. The tube C is inserted, by means of a perforated cork coated with paraffin wax, into the lower end of the combustion cylinder E, which is about 25 mm. (1 inch) in diameter, and 200 mm. (7·9 inches) in height, and tapers off at its upper end to a diameter of 7 to 8 mm. (0·28 inch). The tapered portion, as show in the accompanying diagram, is bent at an angle of 50°, and communicates with the absorption apparatus.



The absorption apparatus consists of two cylinders 250 mm. (9 8 inches) high, and 36 mm. (1·45 inches) wide. At the base of each is a well-fitting cock, to which is fused a lateral tubulure. Each cylinder is closed at the top with a cork coated with paraffin wax; and through the cork passes a tube, which extends to the bottom of the cylinder, which is packed with glass beads 3 to 4 mm. (0·12 inch) in diameter. The cylinders are connected in series to the combustion cylinder E; and the last of the two is connected to a Drechsel flask or bubbling tube, which is attached to a water-suction pump. From 15 to 20 c.c. of a 5 per cent. solution of potassium carbonate, to which a little bromine water has been added, is put into each absorption cylinder. The burner and the tube C are detached from the combustion cylinder E, and the tube D is connected by means of flexible tubing with a Fresenius tower, packed with lumps of pumice saturated with a solution of potassium carbonate and permanganate or chromate. The burner is then lighted, and E is gradually warmed; and the suction pump is set in action. C is then inserted in E, and the meter-index is read. The flame is regulated to correspond to a consumption of 10 to 15 litres (0·35 to 0·53 cubic foot) per hour; and the rate of aspiration should be no faster than is necessary to afford complete combustion of the gas. The aspirated products of combustion pass through the absorption cylinders, where the stream is very much broken up by the glass beads. The sulphur products are thus so effectually absorbed that in most cases only one absorption cylinder suffices; but when a large quantity of gas is burnt, the second absorption cylinder is required to receive the surplus liquid products of combustion. The Drechsel flask or bubbling-tube merely contains a little water, in order to show the rate of aspiration.

When the desired quantity of gas has been burnt, the apparatus is disconnected, and the liquid from the absorption cylinders is collected in a flask, together with the washings from them as well as the combustion cylinder. The washing may, by careful manipulation, be thoroughly performed with so little water that the total volume collected in the flask will not exceed 400 c.c. The liquid in the flask is acidified with hydrochloric acid, and warmed until the bromine is expelled. The sulphuric acid which is contained in it is then precipitated as barium sulphate; and from the weight of barium sulphate found, the proportion of sulphur in the gas is calculated. Corrections are subsequently made for temperature and barometric pressure in the usual manner.

The accompanying table contains the details of some determinations made on the illuminating gas of Rome in October last by this method.

Date of Test.	Gas Consumed.	Hourly Consumption.	Temperature.	Barometric Pressure.	Barium Sulphate obtained.	Sulphur per 100 Cubic Feet of Gas.
1897.	Cub. Ft.	Cub. Ft.	Deg. C.	Mm.	Grains.	Grains.
Oct. 2	1·90	0·422	20	760·20	2·79	21·08
„ 9	1·50	0·376	18	758·12	1·96	18·68
„ 10	1·76	0·451	17	762·50	2·29	18·45
„ 14	2·63	0·421	18	765·00	4·15	22·36
„ 15	2·96	0·465	19	762·10	4·45	20·87
„ 16	2·47	0·429	19	752·00	3·47	20·16
„ 17	2·35	0·427	20	756·20	3·25	20·10

In order to test the accuracy of the method, Signor Longi, having available neither gas of constant composition nor a large gasholder which would serve to contain sufficient gas for a number of estimations, decomposed certain sulphur compounds in a stream of hydrogen, and burnt the gas in the apparatus. The hydrogen was purified and dried, and passed through a tube of refractory glass drawn out at one end and connected directly to the burner. The sulphur compound was put into the tube, in the posterior portion of which was placed, for a distance of 15 centimetres, platinized asbestos, which was heated to a red heat. After the bunsen flame was lighted, the sulphur compound was decomposed by gradual heating, so that the gas consumed was moderately charged with sulphur. The sulphur compounds used were silver sulphide and silver sulphocyanide. The results of the trials are recorded below:—

No. of Trial.	Silver Sulphide.		Silver Sulphocyanide.	
	I.	II.	I.	II.
Grammes of substance taken	1·6681	1·2305	0·3908	1·0748
„ sulphur therein	0·2152	0·1587	0·0753	0·2071
„ barium sulphate obtained	1·5536	1·1499	0·5421	1·4905
„ sulphur in the latter	0·2133	0·1579	0·0744	0·2047
Error in sulphur estimation, per cent.	−0·9	−0·5	−1·2	−1·2

The principal advantages claimed by Signor Longi for this method of estimation are that the apparatus is easily constructed in the laboratory; that the burner and combustion cylinder are so proportioned that condensation of sulphuric acid in the latter is prevented; and that the burner is made exclusively of glass.

THE EFFICIENCY OF ACETYLENE BURNERS.

The following is an abstract translation of a paper by Herr A. Weber, which has just been reprinted by the "Journal für Gasbeleuchtung" from a Swiss contemporary.

Experiments were undertaken for the purpose of ascertaining precise criteria by which the quality of various burners used for acetylene gas might be assessed, since all the burners so far proposed begin to smoke after a short period of use. The tests were made on a special bunsen grease-spot photometer; and the standard light was a certified Hefner-Alteneck lamp. The readings throughout were made in duplicate; and the figures recorded represent the mean of three readings. The calcium carbide was from the Neuhausen works; and as the same carbide was used for all the experiments, no special tests were made as to the yield of gas from it. The illuminating power was expressed in English standard candles from the ratio: 1 English candle = 1·14 Hefner units. The following symbols are used:—

h = Pressure of gas in tenths of an inch.
Q = Consumption in cubic feet per hour.
J = Illuminating power in candles.

Then the quotient $\frac{J}{Q}$ expresses the candle power per cubic foot of gas, and is a measure of the extent to which the gas consumed is utilized.

The figures in Table I. refer to Bray burner No. 0000.

TABLE I.

h	17·60	15·70	13·80	11·80	9·90	7·90	5·90	3·90	2·00
Q	1·11	1·04	0·96	0·85	0·77	0·68	0·58	0·42	0·25
J	41·50	41·50	38·20	33·20	30·20	26·10	18·60	12·70	4·30
$\frac{J}{Q}$	37·37	39·92	39·92	39·07	39·07	38·51	32·28	30·01	17·55

The combustion clearly is bad at the lower pressures with this burner. But with increasing pressure the efficiency increases, until it attains a maximum at a certain pressure (which lies between 11·8-10ths and 15·7-10ths for all fishtail or union-jet burners); and thence the efficiency diminishes with increase in the pressure.

According to Ahrens and Castellani, 1 cubic foot of acetylene theoretically should develop 41·91 candles. On this basis, the maximum efficiency attained with the Bray No. 0000 burner is about 96 per cent. of the theoretical illuminating duty of the gas. Similar tests were made with a number of burners; and

TABLE II.

Burner.	Nuremburg Make.				German Make.		Bray. coco.	Oil Gas Batswing (Best of Several).
	Steatite. No. 2.	Iron. No. 2.	Brass. ooo.	Brass. oooo.	Iron. II.	Iron. III.		
Q (cubic feet)	0·265	0·53	0·777	0·90	0·576	0·66	0 936	0 988
J (candles)	6·780	18·40	28·900	34·30	18·200	22 60	37·600	38·000
$\frac{J}{Q}$ (candles per cubic foot).	25·600	34·70	37·200	38·10	31·600	34·30	40·200	38 500
Percentage of the theoretical duty of the gas .	61·100	82·80	88·800	90·90	75·400	81 80	96·000	91·900

the values obtained for the maximum efficiency of each burner are shown in Table II. All these burners, except the last in the table, were of the fishtail or union-jet pattern, and very like the Bray burner. They all had the same fault—viz., that after use for about twenty hours or less, the flame became irregular, the illuminating power began to diminish, and soot and smoke were produced. The orifices of the burner then needed cleaning by means of a needle, which in time injured them. The difficulty of consuming acetylene without continual cleansing or renewal of burners, has disgusted many persons with the gas, and has retarded its introduction in numerous places.

An immense number of burners of every conceivable description have been tried for the consumption of acetylene, in the endeavour to find one which acted faultlessly. One of the most interesting has been invented by Dr. Billwiller, of St. Gall, in Switzerland.* It consists of a hollow brass casing with the ordinary screw thread, but having mounted on its top two hollow blocks of steatite, diverging from one another at an angle of 90°, and having two orifices on their opposing faces. From these two orifices the gas issues; and the two streams meeting form a flat flame, in the same manner as with the union-jet burner. Each steatite block is, however, provided with a piece of sheet nickel, which laps over the gas-orifices at a little distance from the surface of the block. The nickel is perforated in front of the orifices; and its effect is that the gas issuing from the orifices in the steatite draws in beneath the nickel plate a certain amount of air, which aids the combustion of the gas as it issues from the perforation in the nickel. The perforation in the nickel plate is rather larger than the orifice in the steatite. The flame does not touch the burner, and cannot therefore deposit carbon on it. Tests were made with one of these burners; and the results are given in Table III. But it should be added that the particular burner tested drew in too much air; and the flame became partially disillumined thereby. By more carefully proportioning the distance between the covering plate and the steatite and the size of the perforations in the plates, it should not be difficult to produce a burner which would give precisely the proper supply of air to the gas, and thus afford nearly the theoretical duty of the latter. The efficiency of the Bray burner rapidly falls off, owing to deposition of carbon; but the burner with which the results given in Table III. were secured worked perfectly for some months, without any attention. It will be seen that it attains its highest efficiency at a rather higher pressure than other burners. An efficiency of about 79 per cent. of the theoretical duty of the gas was actually given by it; but it may certainly be concluded that a burner of this type can be constructed to give a uniform efficiency of 92 per cent., or an illuminating power of 38·5 candles per cubic foot of gas. A burner of this type, but of somewhat modified form, has already been placed on the market.

TABLE III.

h	3·900	7·900	11·800	15·700	19·700	23·600	31·500
Q	0·300	0·406	0·565	0·706	0·777	0·883	1·024
J	6·130	9·800	15·600	21·500	25·200	28·500	30·500
$\frac{J}{Q}$	20·430	24·140	27·610	30·450	32·430	32·280	29·790

The illuminating power of an acetylene flat-flame burner was ascertained at intervals of 10° in the horizonal plane, in order to determine the difference in the illumination from the flat side and the narrow side of the flame. For 20° on either side of the normal to the flat side of the flame, the illuminating power was the same; but beyond these limits it receded gradually, until at 70° to the normal it was only about 90 per cent. of the illuminating power at the normal. At 90°, or facing the narrow side of the flame, the illuminating power was 75 per cent. of that at the normal to the flat side of the flame. In other words, the narrow side of the acetylene flame emits three-fourths the light which the broad side emits in a direction at right angles to it.

Public Lighting by Acetylene Gas.—Plant for the production of acetylene gas for street-lighting purposes is being erected at Stolzenfels, near Loden.

* An illustrated abstract of Dr. Billwiller's patent specification appeared in the "JOURNAL" for Dec. 14 last, p. 1289.

MICHIGAN (U.S.A.) GAS ASSOCIATION.

Annual Meeting at Port Huron.

The Fifth Annual Meeting of this Association was held on Feb. 16 and 17. Mr. HENRY W. DOUGLAS, of Ann Arbor, occupied the chair; and there was a good attendance. Five active and nine associate members were elected.

The President, in the course of his Inaugural Address, claimed that their small Association had been successful in enabling members to get acquainted, to compare results, and discuss all sorts of questions freely, including some that might perhaps be considered too simple in larger associations. He trusted that the same freedom and openness that had characterized their discussions in the past would prevail in the future. He recommended that all papers to be read should be printed and circulated in advance; but was not in favour of publishing a full report of their discussions. From inquiries he had made in their district, it appeared that during the year 1897 the consumption of gas had increased to the extent of nearly 10 per cent. The unaccounted-for gas had also increased, which seemed to suggest the necessity for more attention to old mains and services, many of which should be replaced by new ones. About 35 miles of mains, and nearly 3000 new services, had been laid during the year; and the consumption per consumer remained at about 23,000 cubic feet. This showed that the increased consumption was entirely due to new consumers; and he dwelt on the advantages of increasing the consumption per consumer. The record of new stoves and appliances was not complete in all cases; but it was evident that the number was larger than would account for the increased consumption, and that they were falling off in some directions. Over 100,000 incandescent burners were now used in the State, of which about one-third were fixed during the past year. The average life of a mantle was eight months, and might be anything between three and twelve months, according to the care bestowed upon it. With one exception, all the companies sold the burners themselves. This he regarded as necessary, as no one was more interested in the satisfactory maintenance of these appliances than the gas company. The so-called infringing incandescent lamps were sold in every city, and were generally pronounced to be unsatisfactory; but part of the difficulty at any rate, was due to the ignorance of the parties handling them. Only 12 gas-engines had been placed during the year; and he would like to see the makers of these appliances enter the field with as much enthusiasm as the gas-stove men had shown. He congratulated the Association on the passing of a Bill by the Legislature, to provide for the punishment of persons who fraudulently obtained water, gas, or electricity. The low prices of coal and good values of residuals, rendered those who were making extensions inclined to look favourably on coal-gas processes; but the difficulty of disposing of tar still existed. Good prices could be obtained in the summer; but the trouble was how to get rid of the winter make. This matter might well be considered by the Association. Gas companies were just waking up to the fact that they must do business on the same lines as other mercantile enterprises; and they could not give too much attention and thought to the best methods of advertising or pushing the product.

Mr. Frank W. Hess, of Ann Arbor (Mich.), read a paper entitled "Experiments with the Welsbach Lamp." He had made some experiments as to the relative cost of gas, oil, and electricity; and for a cost of 6½d., he found that the best oil-lamp gave 895 candle-hours; the electric incandescent lamp, 277; and gas with the Welsbach burner, 1354—showing the latter to be the cheapest. It was claimed that the incandescent electric light was the best and most convenient for shop windows; but he had proved that the Welsbach burner, with electric igniter if desired, was quite as good. To ensure its success, however, the gas company must themselves give attention to the finer points of construction and action of the lamp. The principles necessary to success were sufficient pressure, proper flow through the check, efficient mixing and spreading of the bunsen flame, and proper suspension of the mantle. The shape of the flame should be such that the invisible outer cone of products of combustion should exactly fit the interior of the mantle. If the initial pressure was not sufficient, the flame would be apt to strike back; and making the gas jet larger, would not remedy this defect. The mixture of gas and air passing through the bunsen tube should have a certain velocity. The volume and velocity of

flow through it must not be less than the volume and activity of the burned gases passing off the flame. If this did not obtain, the inner green zone would be depressed, and heat would be transmitted back into the burner. He preferred an adjustable check to a so-called self-acting governor. The flame must not be too large or irregular in shape, as the life of the mantle was thus endangered; and no portion of the mantle should be actually enveloped by flame. The bunsen flame was divided by chemists into three zones—viz., the inner hollow zone, where combustion had not commenced; the middle zone, where dissociation of hydrocarbons took place; and the outer invisible zone, where the products of combustion pass off. The second zone was a reducing flame, and the outer one an oxidizing flame; and this was the reason why the mantle should come in the third, and not in the second zone. A large or irregular flame was also the cause of perforations in the mantles, or of their giving way near the apex. A mantle that was blackened by deposit of carbon was thereby weakened. The gauze and spreader in the burner were intended to mix the air and gas, and to shape the flame; and they were therefore very important, and should always be clean and in order. A few experiments at the photometer would greatly elucidate these points, and render the observer able to trace defects. An ideal Welsbach lamp, with gas of 18½-candle power at 26-10ths pressure, used 2·9 cubic feet of gas per hour, and gave 61 candles. If the pressure was reduced to 15-10ths, the consumption of gas remaining the same, the duty was not much reduced, but the light was unsteady. From 15-10ths to 6-10ths—which was the lowest possible limit—the candle power gradually fell to 42. If the consumption, as well as the pressure, was reduced, the illuminating power diminished in a greater proportion. Dirty chimneys, dirt or holes on the gauze, or deposits of carbon, might reduce the value anywhere down to 50 per cent.; and for these reasons he advocated that the gas companies should undertake lamp insurance, keeping them in order for a fixed charge. As the results of insuring 240 lamps during 1897, the cost was about 3s. 6d. per lamp, which included labour and about two mantles and one chimney. He used glass chimneys entirely, except under special circumstances. None of the other incandescent burners on the market were equal to the Welsbach; and this point was illustrated by particular examples, showing deficiency of candle power, lack of durability, or other defects.

A paper on "The Utilization of Coal Tar by Distillation" was read by Mr. E. J. Elles, of Detroit (Mich.); and it included an illustrated description of a tar-plant recently erected by the Detroit Gas Company. The still, which is of 6000 gallons capacity, is made of steel plate ½-inch thick, and is 16 feet long and 8 feet in diameter; being in the form of a cylinder, with curved ends. There is a dome with an outlet leading to the condenser; one 18-inch and one 14-inch man-hole, with covers to allow access to the interior; and the still is so protected by brickwork that the flame from the furnace does not come into actual direct contact with it. A 2-inch safety-valve, two 1-inch test-cocks, a 4-inch outlet at the bottom for running off the pitch, leading in a straight line to the pitch bay, and a pyrometer registering up to 900° Fahr., complete the fittings. The pitch receiver or cooler is made of ¼-inch iron plate, 20 feet long and 6 feet diameter, and supported by three brick piers in a convenient position at the back of the still. There are three 2-inch connections for drawing off the pitch into barrels; and it must remain in the cooler for at least 12 hours before being so drawn off. Two large storage tanks—one for ammoniacal liquor and light oil, and the other for heavy oil—each capable of containing about 7000 gallons, are included; and the condensing tank, which is 6 feet diameter and 9 feet high, stands vertically on the top of the heavy oil tank. It contains a coil made of 3-inch heavy galvanized wrought-iron pipe, 60 feet long, which is connected to the dome of the still by a pipe tapering from 6 to 4 inches in diameter. The water in the tank should not be warm while the water and light oil is passing over, but should be warmed as soon as the heavy oil commences, as if too cold naphthalene may crystallize in the coil and throw a dangerous pressure on the still. There is also an overhead steaming-tank, in which the tar is heated to 212° before being admitted to the still; and a single-action air-compressor with 12-inch stroke, for blowing air into the tar, which is supposed to facilitate the separation of water. This compressor can also be used for forcing air into the pitch-cooler to assist the cooling. In the steaming-tank, a quantity of water rises to the surface and is drained off. About 5000 gallons of crude tar is a proper charge for the steaming-tank; and this after treatment leaves about 4400 gallons to go into the still. The fire must be slow at first, to avoid danger of foaming. But as soon as a temperature of 220° is reached, all risk of this is passed, and the fire can be increased. The operation is continued till the pyrometer registers 525° Fahr., which completes the run if a roofing pitch is desired. The light oils were largely used for the manufacture of black varnish; the usual formula being 40 parts of soft pitch, 6 parts of light oil, and 6 parts of naphtha. The heavy or creosote oil was chiefly used for preserving wood. The results obtained at Detroit from 44,000 lbs. of crude tar (88 barrels, or 4400 gallons) were 70 barrels of pitch, 8½ of heavy oil, 3½ of light oil, and 2 of ammoniacal liquor. About 2500 lbs. of coal were used for fuel; and the time occupied was 17 hours.

After some discussion on the subject of the paper, a Committee of three was appointed to determine whether it would be profitable or advantageous for other companies in the State to engage in tar distillation.

Mr. S. M. Dole, of Adrian, followed with a paper entitled "Our Patrons, and How to Treat them." He advocated a comfortably large office, well furnished, cleaned, and lighted, not squalid on the one hand, or extravagant on the other. A competent clerk should always be in attendance in the absence of the manager; and all callers should be treated with courtesy and consideration. This should also be impressed upon the gas-fitters, index-takers, and all who have to do with consumers.

A description of a closed purifying vessel by Mr. H. G. Beatley, of Marquette, was read by the Secretary, in the absence of the author. The idea was based on the gas-washer—viz., the continuous supply and removal of the material. If this could be done, why were several purifiers needed? The work could be accomplished in one purifier, just as they could do with one washer or one condenser. There must be a sufficient depth and area of oxide for the quantity of gas to be dealt with. The present system of purification was open to many objections, as had been shown by Mr. Shelton in a paper read before the American Gaslight Association, and by the apparatus known as Cripps' grid valve, which was intended to bye-pass the lower layers as soon as they were saturated, and thus enable the upper ones to be thoroughly charged, without risk of back-pressure. From this, it appeared that some advantage would be gained by removing the material before it had time to become sodden and hard; but that could only be done, under the usual process, by also sacrificing some material which was not fully saturated. He therefore proposed an apparatus that would pass a continuous stream of oxide. The purifier was funnel-shaped, having the gas inlet at the side near the bottom, and an outlet at the top, with an overhead feed hopper and screw for regulating the admission of oxide, and an outlet at the bottom working in connection with conveying machinery in such a manner that the oxide as it escaped from the vessel was conveyed to the top of a revivifying shoot, set at an angle of 30°, having a large number of baffle-plates. Falling slowly from one to another of these plates, it would be turned and thoroughly exposed to the air; the process being facilitated by a current of hot air injected near the bottom of the shoot. Having traversed this apparatus, it would be conveyed by means of another endless chain of buckets to the overhead feed hopper. The method of working was to so adjust the supply of oxide, that it would reach the bottom of the purifier before it was thoroughly saturated; and being continually in motion, no part of it would get caked and hard, and therefore a greater depth of material could be used in the purifier than was practicable under the ordinary system. He thus claimed to secure an automatically closed vessel, the form of which, with the aid of a mechanical spreader, enabled an evenly packed layer of oxide to be maintained, in which the quantity of material handled could be exactly proportioned to the make of gas. The risk of back-pressure was removed; a smaller stock of material would suffice, labour was economized, and no revivification floors were required. There was greater efficiency, less risk of passing foul gas, and no nuisance or smell from changing boxes. A purifying box on this system, to deal with a maximum of 1 million cubic feet per diem, would contain 80 bushels of oxide, the depth of which would be 7 feet, through which the gas would have to travel. The discharging arrangement consists of flat gratings, having a reciprocating movement, or revolving bars, or preferably a revolving grate covering the entire bottom of the purifier. The method of operation was to fill the purifier and overhead hopper with oxide, turn on the gas, and adjust the speed of the feeding screw and the bottom bars so as to agree with each other, and suit the quantity of gas being treated. There is a cavity in the bottom of the purifier for receiving the used oxide, from which it is allowed to fall out by opening a slide at suitable intervals, and passed through the revivifying shoot and up to the overhead hopper, as above indicated. The feed-screw was so arranged as to be actuated by the level of the oxide under the spreader.

Some private business concluded the proceedings.

German Association of Gas and Water Engineers.—The thirty-eighth annual general meeting of this Association will take place at Nuremberg on the 14th of June next and the four following days. The proceedings will open on the evening of the 14th with a reception by the President of the Association, Herr L. Körting, Manager of the Hanover Gas-Works. The next three days will be devoted to the reading and discussion of technical papers, the subjects of which will be announced later. The last day is reserved for sight-seeing.

Waverley Association of Gas Managers.—The seventy-fourth half-yearly meeting of this Association will be held in the Milton Street Hall, Abbeyhill, Edinburgh, on the 14th inst., under the presidency of Mr. H. Rutherford, of Aberlady. According to the programme issued by the Hon. Secretary (Mr. W. B. M'Lusky), there will be a short address by the President, followed by an informal discussion. The proposal of the North British Association in regard to the standardizing of meter unions will be considered, and the officers for the ensuing year appointed. A visit will be paid to the Milton House Works of Messrs. J. Milne and Son, Limited, where, by the invitation of the firm, the members will partake of light refreshments. In the afternoon they will drive to the Forth Bridge, and dine at the Hawes Inn, South Queensferry.

REGISTER OF PATENTS.

Incandescence Bodies for Illuminating Purposes.—Hamel de Manin, Count G. L. A., of South Kensington. No. 5817; March 4, 1897.

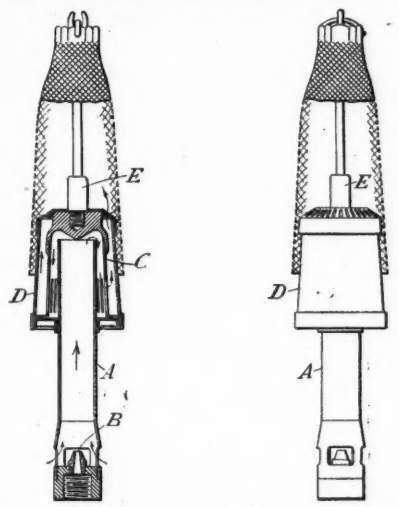
The patentee proposes to impregnate the hood, mantle, or the like, (made of any suitable fabric) with an aqueous solution or thin paste of a mixture of chloride of lime or salt of calcium with caustic soda or other alkali. The mantle is then dried, and the fabric burnt out in the ordinary manner, "leaving a frame or skeleton of lime that is coherent and not liable to crumble away, and which, when heated to incandescence, emits a most powerful light." The mantle may be indurated or hardened by immersing it, preferably after drying and before burning off, in a solution containing silica or alumina.

Included in the specification are mentioned the constituents of sixteen different solutions which are said "to give excellent results"—containing some of the following solids and liquids in varying proportions: Precipitated chalk, calcined or oxide of magnesia, chloride of lime, caustic soda (solid), caustic potash, chloride of calcium, hydrated or crude powdered lime, hydrate of aluminium, oxide of magnesia, ammonia solution, hydrochloric acid, picric and nitric acid, methylated spirit, and water.

Burners for Incandescent Lighting.—Moeller, J., of Palmer Street, Westminster. No. 6775; March 15, 1897.

This burner is designed "to obtain a very thorough mixture, and also certain heating of the gas and air current on its way to the flame."

There are three concentric tubes—an inner tube A, into the bottom of which air is drawn through orifices by the injector action of the gas issuing from the small orifice B at the bottom; a second tube C, closed at the top and surrounding the inner tube, so that the mixture of gas and



air which ascends this tube is deflected at its top and caused to descend the annular space surrounding the inner tube; and the current then passing through slits, ascends an annular space within the third or outer tube D to the opening of this tube at the top, which is covered with wire gauze or perforated metal. From the top of the middle tube, a metal stem E extends upwards through the centre of the flame, to carry the incandescence mantle; and this conducts heat down to the tubes below "by which the current of mixed gas and air is more or less heated."

Gas-Fires.—Parkinson, W. C., of Birmingham. No. 6942; March 17, 1897.

This invention in gas-fires has for its object to create, or accelerate the creation of, a draught within the chimney by mounting in the upper part of the fireplace, and above where the fuel is placed, "a pull-out, draw-down, hinged, or other supplementary hood, draw-plate, or draught accelerator, working in guides and preferably provided with means for retaining it in a raised or partly raised position, yet capable of being easily released and lowered into its position of use."

Gas and Oil Lamps.—Rees, W. A., of St. John Street Road, E.C. No. 7304; March 20, 1897.

This invention is designed to provide means whereby the air necessary to support combustion can be introduced in such a manner as to avoid danger of cracking the globes or chimneys, or breaking the mantles where incandescent burners are used. The main feature of the invention consists in so arranging the air-inlets that the air flowing into the lamp takes a spiral or rotary motion inside, and circulates around the interior (and around the mantle, if one be employed), instead of flowing direct to the burner in a radial, or approximately radial, direction.

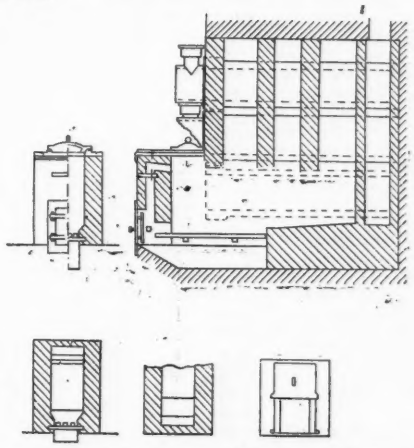
Utilizing Waste Gases from Retort-Settings, &c.—Shadbolt, R. G., of Grantham, and Broadhead, J. W., of Elland, Yorks. No. 10,838; May 1, 1897.

This invention (the specification of which is not illustrated) applies to "all systems of firing where the fuel, gases, or heat are derived from an incandescent or glowing body of carbonaceous material—as coke, anthracite coal, &c.—and consists essentially of passing waste gases and atmospheric air through any other furnaces or producers than that from which the waste gases and heat originated, whereby the waste gases and heat are re-used and consumed, instead of being allowed to escape directly into the atmosphere. The result of this arrangement is that a considerable saving of fuel is effected in the producers or furnaces supplied with waste gases and air, as compared with a supply of air alone. The principal action—apart from conserving the heat of the waste gases—is that of the waste gases in conjunction with the supply of air upon the incandescent material forming the fire."

A great proportion of waste furnace gases, the patentees point out, consist of carbonic acid gas, which in passing through the body of glowing fuel is converted into carbonic oxide; so that the proportion of atmospheric air admitted to the furnaces or producers in conjunction with waste gases is simply the quantity requisite to maintain the solid fuel in the condition best suited to reconvert the carbonic acid into carbonic oxide. They find, in practical working, that the waste gases issuing from one bed of gas-retorts (as an example) are sufficient to supply two or more furnaces or producers according to their construction, working conditions, &c.; and the method of introducing the waste gases into their producers, &c., must be varied to meet separate and individual requirements, but the action and result is fundamentally the same. For example, in one instance it will be found expedient to admit an admixture of waste gases and atmospheric air at the bottom of the furnace or producer; in another instance, it will be of advantage to admit the requisite air supply alone at the bottom, and the waste gases at a point some little distance up the furnace, either at the front, back, or sides, or part at each; and yet again, it will be found advisable in some instances to admit the air at the bottom and the waste gases at the top of the fuel—the gas-outlet being in such cases lower than the top of the fuel. In many cases—as in settings of gas-retorts, kilns, and similar brick constructions—it is sometimes undesirable to work the secondary furnaces or producers (*i.e.*, those dealing with waste gases) under too great a vacuum, as the amount of air drawn in through innumerable cracks and crevices quickly reduces the internal heat. To avoid this, they introduce fans or blowers as occasion requires to accelerate the draught between the primary and secondary furnaces, &c., and are thus enabled to reduce the chimney-pull on the secondary furnace, which would otherwise be unavoidable. In other instances, where the chimney-pull is deficient, and the construction of the furnaces, &c., renders them practically air-tight, they accelerate the draught either by the above means or by an artificially induced draught in the chimney, or other similar arrangement. But whatever variation may be necessary in applying the principle owing to local peculiarities, structural defects, &c., the principle itself remains the same—*i.e.*, the reconversion of waste gases (chiefly carbonic acid gas) to combustible gases (mainly carbonic oxide), which thus formed are again converted into waste gases upon coming into contact with the air supply requisite for combustion. This recuperative arrangement may be carried on until the waste gases finally become inert through the continually increasing proportions of nitrogen, sulphurous oxides, &c.

Heating Coal-Gas Retorts.—Forrett, A., of Alfreton. No. 9345; April 13, 1897.

This invention consists in bringing the furnace forward, and covering it by a sliding cover and frame, so that it may be fed with coke direct from the retorts. The air-supply passes up the front and feeds the furnace at the top, as shown in the illustration—the furnace half in elevation and half in section; the furnace applied to a bed of retorts; a section of the furnace without the cover and frame, a sectional plan of the furnace; and a plan of the sliding cover and frame, with a fire-brick fitted in it.



The claims for the invention are: (1) An incandescent furnace for heating gas-retorts, situated externally and above the surface; (2) in an incandescent furnace the combination of the above with an air passage or flue regulated with a damper; and (3) in an incandescent furnace the combination of the above with the cover and scoop or bonnet.

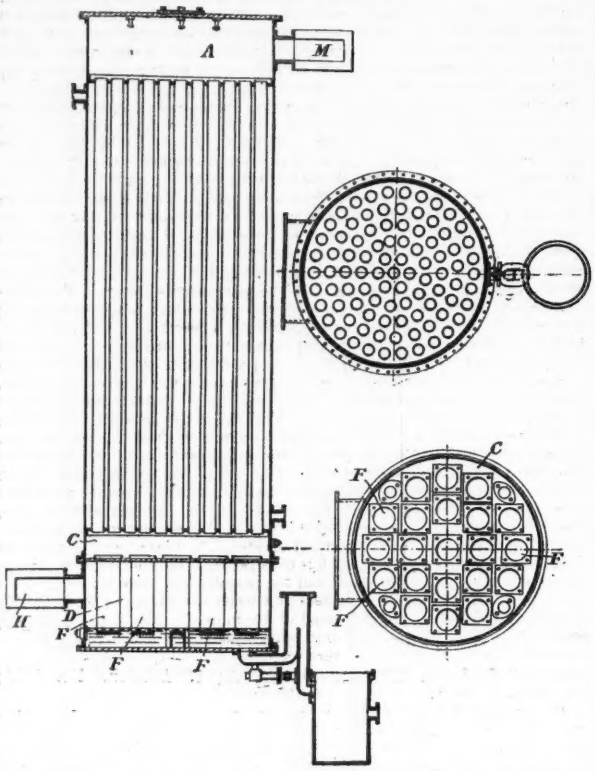
Gas-Lamps for Railway Carriages.—Welch, W. H. I., of Bow, E. No. 11,117; May 4, 1897.

The patentee proposes to increase the brilliancy of overhead railway carriage gas-lamps by carrying down through the reflector into the globe-space not only the gas-pipe, but also an air-pipe which surrounds the gas-pipe (being eccentric to it), so that the passage for air is almost entirely along the upper side of the gas-pipe. The air descending along this passage from the chamber above surrounding the chimney, and being heated as it passes through the chamber, "plays upon the upper side of a horizontal flat flame, rendering the combustion complete and brilliant." Instead of a single flame, there may be two on the same plane, on both of which the air-current plays; and in this case there may be two air-pipes, one for each burner. The air for the underside of the flames is supplied to the globe space in the usual way by holes through the reflector, from the space above it.

Cooling and Washing Gases.—Collin, F. J., of Dortmund, Germany. No. 10,988; May 3, 1897.

This invention relates to tubular apparatus for cooling gases, provided with a special lower part or base carrying an arrangement of dip-pipes,

whereby the gas is forced, in whatever direction it may be travelling through the apparatus, to pass through the washing liquid contained in the base, either before or after it flows through the cooler proper. The washer liquid trickles continuously from above into the base, and is thus brought intimately into contact with the gases, whether the gases and liquid flow in the same or in contrary directions.



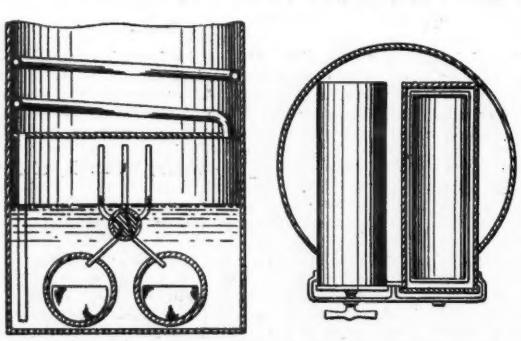
The apparatus is shown in longitudinal section, with vertical sections taken above the preliminary washer and through the cooling-pipes.

The apparatus has at top a gas-distributing chamber A, communicating through the system of cooling-tubes with the gas-collecting space C. The space round the cooling-tubes is kept full of cooling water entering and flowing off respectively through the side branches. The space C is also separated from the dip-pipe chamber or base D by means of a plate, in which the dip-pipes F are fixed gas-tight; the lower ends being immersed below the level of the water, the height of which is determined by the discharge-syphon shown. Above the water-level is a branch-pipe H for the discharge of the gas.

The apparatus operates as follows: Spraying nozzles uniformly distributed under the cover of the chamber A lead the washing liquid in the form of spray from the gas-distributing chamber down the inner surfaces of the cooling-tubes, and thence through the space C, through the dip-pipes F into the dip-pipe chamber D, whence it flows off through the syphon. The gas enters the chamber A through the supply-pipe M, and is there already brought in contact with the spray of washing liquid.

Acetylene Gas Generator.—Smith, F. H., of Dunblane, N.B. No. 15,754; July 2, 1897.

The object of this invention in acetylene gas generators is to provide for "automatically supplying the water to one chamber after the carbide in the other is exhausted, thereby enabling the chambers to be recharged alternately without interfering with the gas being formed in the other."



The generator consists of a tank or box divided (as shown) into an upper and lower chamber, and connected by a tube depending from the bottom of the upper chamber to near the bottom of the lower one. Within the lower chamber are three upright tubes, the two outer provided with slots or openings at the same level, while the central tube has a similar opening at a higher level. Within the lower chamber, and below, or at the sides of, the three upright tubes, are two tubular recesses, so arranged that the water in the upper chamber is free to circulate round them. The recesses hold the carbide drawers, which are semi-circular in shape. Access is obtained to them by flat metal doors clamped by any means ensuring a gas-tight joint. This arrangement, says the patentee, keeps the gas cool, and prevents the possibility of an explosion; while the formation of the drawers ensures that the moisture formed by condensation within the recesses cannot come in contact with and attack the carbide, but trickles down outside the drawers.

For regulating the supply of water to the carbide drawers, there is a five-way cock, with ports leading to the three upright tubes and the two drawer tubes, and provided at the outside of the generator with an operating handle. The arrangement of the ports is such that the supply of water to the carbide drawers can be cut off altogether or be actuated in one direction to open the ports leading from the one outer tube to the tube of the one carbide chamber, and at the same time the ports leading from the central tube to the tube of the other carbide chamber. Thus upon the introduction of water, it will rise until level with the lower slots in the two outer tubes, and will pass through the open one, attack the carbide, and form gas, after which the water will be forced into the upper chamber until the carbide has been exhausted. The water then rises until it reaches the slot in the central tube, when it attacks the carbide in the other chamber. The cock can then be operated to stop the supply to the second chamber by the central tube, but enabling it to be done through the side tube which feeds the first chamber. The supply to the first chamber is thus stopped; the other outer tube being also closed—enabling it to be recharged.

Gas and Oil Motors.—Southall, J., of Worcester. No. 17,204; July 21, 1897.

The inventor's patent No. 18,995 of 1895 refers to the use of chain-gearing for operating the valves of gas and oil engines; and the present invention consists chiefly in arranging pitch-chain gearing for this purpose in such a manner that the increase in the length of the chain caused by wear may be readily taken up as it occurs without altering the setting of the valves—an arrangement applicable to motor engines generally.

APPLICATIONS FOR LETTERS PATENT.

6823.—Clark, J., "Shelf for gas-ovens." March 21.

6826.—French, J. T., "Valves for regulating the supply of gas to burners." March 21.

6860.—Stoecklin, L., "Self-igniting mantles for glow-light." March 21.

6897.—Gazzard, J., "Gas-engines." March 22.

6925.—Loeser, I., "Globe glass for gas-burners." March 22.

7065.—Ryland, H. S., and Townley, A. N., "Acetylene gas generator." March 23.

7070.—Edwards, E., "Acetylene gas apparatus." A communication from L. Steiner. March 23.

7080.—Lake, H. H., "Gas-generators." A communication from W. J. Nesbitt. March 23.

7124.—Allan, J., and M'Robbie, J, "Cleaning appliances for incandescent gas-lamps." March 24.

7145.—Sinclair, J. A., and Powell, E. R., "Generating and cooling acetylene gas." March 24.

7157.—Williams, E., and Gore, J., "Acetylene generators." March 24.

7184.—Gurovits, E., "Treatment of acetylene gas for preventing the deposit of solid carbon therefrom when burning." March 24.

7195-6.—Simms, F. R., "Ignition gear for explosion engines." March 24.

7237.—Richmond, E. W. T., "Gas-heated water heaters or boilers." March 25.

7246.—Prusheit, G., and Kovacsovics, C., "Measuring and mixing gas and air." March 25.

7255.—Köllisch, B., "Acetylene lamps." March 25.

7280.—Rosinski, S., and Ducruixe, V., "Automatic gas-lighting apparatus, and incandescible composition to be employed therefor." March 25.

7298-9.—Lentschat, G., "Igniting and extinguishing the flames of gas-burners." March 25.

7348.—Balch, B. D., "Acetylene lamps." March 26.

7352.—Melhuish, J. B., Guthrie, M, and Hughes, J. H., "Acetylene lamps." March 26.

7373.—Day, P. B., and the Acetylene Illuminating Company, Ltd., "Apparatus for mixing two or more gases in any desired proportions." March 26.

7392.—Glover, R. T. & J. G., "Determining the strength of the blast of bunsen flame." March 26.

7393.—Glover, R. T. & J. G., "Gas-heaters, such as stoves and the like." March 26.

7395.—Gibbons, W. P. & G. B. A., "Tiles for regenerative furnaces." March 26.

7396.—Gibbons, W. P. & G. B. A., "Gas-retorts and appliances for making the same." March 26.

Dorking Gas Company.—The half-yearly meeting of this Company was held last Tuesday, Mr. W. T. Butler presiding. The report stated that after providing for the interest on the debenture stock, there was a balance of £2614 available for dividend. The Directors recommended the payment of maximum rates on all classes of shares, which would absorb £872, and leave a balance of £1742 to be carried forward. During the half year the net selling price of gas to private consumers had been 3s. 6d. per 1000 cubic feet, and for public lighting 3s. 1d., as compared with 3s. 7d. and 3s. 2d. respectively in the corresponding period of 1896. The manufacturing operations had been satisfactory, although carried on at some disadvantage during the extension of the plant. These extensions had now been completed; and a new oil-gas plant was working satisfactorily. The Chairman, in moving the adoption of the report, expressed the regret of the Directors at the loss they had sustained by the death of their Chairman, Mr. John Young. The deceased gentleman had been a member of the Board for 29 years, and Chairman for 28 years. During that period, the Company had prospered, and the price of gas had been reduced from 5s. 6d. to 3s. 6d. per 1000 cubic feet. Mr. Butler also spoke hopefully of the prospects of the Company. The report was unanimously adopted.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons and read the first time: Northam Urban District Water Bill, North Warwickshire Water Bill, Norwich City Water Bill, Whitwick and Coalville Gas Bill.

Bills reported, with amendments: Bakewell Gas Bill, Folkestone Gas Bill, Liskeard Corporation Water Bill, Stirling Gas Bill, Yeovil Corporation Bill.

Bills read the third time and passed: Edinburgh and District Water Bill, Edinburgh and Leith Corporations Gas Bill, Folkestone Gas Bill, Morley Corporation Gas Bill, Sheringham Gas and Water Bill, Swansea Gas Bill, Waterford City Gas Bill, Yeovil Corporation Gas Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills brought from the Lords and read the first time: Edinburgh and District Water Bill, Edinburgh and Leith Corporations Gas Bill, Folkestone Gas Bill, Morley Corporation Gas Bill, Sheringham Gas and Water Bill, Swansea Gas Bill, Waterford City Gas Bill, Yeovil Corporation Bill.

Bills reported: Enfield Gas Bill, Hartlepool Gas and Water Bill, Ilkeston Corporation Bill, Middlesbrough Corporation Gas Bill, St. Anne's-on-the-Sea Gas Bill, York United Gas Bill.

Bills read the third time and passed: Northam Urban District Water Bill, North Warwickshire Water Bill, Norwich City Water Bill, Whitwick and Coalville Gas Bill.

The Carmarthen Improvement Bill, the Drogheda Gas Bill, the Rhymney and Aber Valleys Gas and Water Bill, and the Wishaw Water Bill (in group D) have been referred to a Select Committee, consisting of Sir W. Coddington (Chairman), Mr. Channing, Mr. Doxford, and Mr. S. Moss; to meet on Thursday, April 21.

The Gaslight and Coke Company Bill, the Southwark and Vauxhall Water Bill, and the Staines Reservoirs Joint Committee Bill (in group F) have been referred to a Select Committee, consisting of Mr. Johnson-Ferguson (Chairman), the Hon. T. W. Legh, Mr. Crombie, and Mr. Alfred Arnold; to meet on Thursday, April 21.

Permission has been given to the Gainsborough Gas Company to deposit a petition for a Bill to enable them to increase their capital.

HOUSE OF COMMONS COMMITTEE.

(*Before Sir* J. KITSON, *Chairman, Captain* PIRIE, *Mr.* BALDWIN, *Mr.* E. R. P. MOON, *and Mr.* BONHAM CARTER, *Referee.*)

As briefly recorded in the "JOURNAL" last week, the above-named Committee, who re-assembled on the 22nd ult., took up the consideration of the

HARTLEPOOL GAS AND WATER BILL.

In this Bill powers were asked by the Hartlepool Gas and Water Company to construct two new reservoirs and other works, to compulsorily acquire certain property, and to raise further capital for these purposes. The principal petition against the Bill was that of the Corporation of West Hartlepool, who alleged that the charges authorized by the present Acts of the Company were higher than those now sanctioned by Parliament, and were not justified by the expenditure involved; that the water proposed to be obtained under the Bill was liable to contamination, and might be a fruitful source of disease; that the Corporation had no means of satisfying themselves that the Company were not mixing their soft water, which was only fit for trade purposes, with their hard water obtained from the magnesian limestone which was used for domestic supply; and that the proposed increase of capital was excessive. It was also complained that the illuminating power of the gas supplied was insufficient, that the Company were not under the sliding-scale in regard to dividends; and the petitioners asked, seeing that the tendency of Parliament had been to entrust the supply of water and gas to local authorities, that clauses should be inserted in the Bill, if it were passed, enabling the Corporation to purchase the undertakings. There were also two landowner petitioners. The Company were incorporated by Act of Parliament in 1846, to supply the town of Hartlepool and district with gas and water, with a capital of £18,000 and borrowing powers to the extent of £6000. Several applications, necessitated by the growth of the district and especially the development of West Hartlepool, were made to Parliament for powers to increase the capital of the Company, for extension of works, &c. In 1849, the capital authorized was £34,000; in 1855, £100,000; in 1867, £200,000; and in 1878, £400,000—proportionate borrowing powers being sanctioned in each case. The dividends were fixed at 10 per cent. on the £34,000 authorized by the Act of 1849, 7½ per cent. on the additional £66,000 authorized in 1855, and 7 per cent. on the £300,000 authorized under the subsequent Acts. The loan capital authorized by the Act of 1878 has been borrowed at 3 per cent. In the present Bill, the increase of capital asked for is £150,000, to be raised under the auction clauses at 7 per cent., with borrowing powers to the extent of £37,500.

Mr. Balfour Browne, Q.C., Mr. Claude Baggallay, Q.C., and Lord Robert Cecil appeared for the Company; Mr. Worsley Taylor, Q.C., and Mr. E. H. Lloyd for the Corporation of West Hartlepool; and Mr. Pember, Q.C., and Mr. J. D. Fitzgerald, Q.C., for Mr. Anthony Wilkinson, one of the two landowner objectors.

In opening the case for the Bill, Mr. Balfour Browne reviewed the history of the Company and the circumstances under which the various Acts were applied for and obtained. The water question in Hartlepool, he said, was a unique one. The town stood on a bed of magnesian limestone, in which there was an immense reservoir of excellent water. Although to some extent impregnated with mineral matter, this water was perfectly wholesome for drinking and domestic purposes; but it was much too hard for trade supply. It therefore became necessary for the Company to go farther afield to supply the trade demand. With this view, they had constructed two reservoirs about six miles from West Hartlepool—one on the Hurworth Burn, and another on the Hart. From the water collected at the gathering grounds and stored in these two reservoirs, the town was supplied by gravitation with a soft water. In addition to the Acts granting increases of capital, others had been obtained which extended the limits of the Company and authorized certain works, mainly in connection with gas. While the domestic water supply was amply sufficient and practically inexhaustible, the Company were now absolutely at the end of their tether in regard to the trade supply; and it was found necessary to construct further works to meet the demand for water for trade purposes. The works proposed in the present Bill were a reservoir at Crookfoot, on the Amerston Beck, and another at Dalton Piercy, to collect the water of the Dalton and neighbouring becks. Both reservoirs would be on property belonging to Mr. Wilkinson. The necessary conduits to bring the water into Hartlepool were to be constructed. Counsel pointed out the effect of issuing capital under the auction clauses, and said that the more money borrowed the better for the consumers, because that money bore a less rate of interest than share capital. In 1875, the trade demand was 298 million gallons; in 1890, it had risen to 342 million gallons; and in 1897, 417½ million gallons were supplied, or 1,346,000 gallons a day—giving an average per head of the population of 15 gallons for trade purposes alone. The existing reservoir at Hurworth had a drainage area of 2800 acres, with a yield per day of 1,084,000 gallons; while the Hart reservoir, with a drainage area of 664 acres, yielded 212,480 gallons per day—or a total of 1,296,480 gallons. They were therefore short of water. The proposed Crookfoot reservoir, with a drainage area of 1340 acres, would have a storage capacity of 150 million gallons; and the Dalton Piercy reservoir, with a drainage area of 1720 acres, would hold 60 million gallons. The Hurworth reservoir was too small for its drainage area; and it was proposed to catch the rain in the Hurworth beds, and pass it on to the Crookfoot reservoir, and there store it. At Hurworth, the rainfall was 23·43 inches per annum; and at the Hart, 21·12 inches. Making an allowance on the mean of the two of 16 inches for evaporation and absorption, this left an available rainfall of 6·27 inches per annum. Under the Water-Works Clauses Act of 1847, full compensation had to be given to the owners of any springs or streams that were affected by the operations of a water company; but the practice had grown up in Parliament of putting upon the promoters of a water company the obligation to give compensation in water instead of in money. The companies were obliged to collect the water during rainy seasons, and let it out into the streams at a time when they were too dry. The question in the present case was what would be fair compensation. Where there were large mills depending on the stream for power, the usual course was to give one-third of the collectable water to the stream, and take two-thirds for the town. Here there were no mills on the stream, which was therefore in much the same position as the Rede running through the Duke of Northumberland's property on the Cheviots, and which was taken by the Newcastle and Gateshead Water Company under an Act of 1894. There was only one mill on the Rede; and in that case the whole matter of compensation was fully discussed. The principle was there laid down that, instead of one-third to the stream and two-thirds to the Company, one-fourth should be given as compensation to the stream, and the Newcastle and Gateshead Water Company should have three-fourths. The Hartlepool Company asked to be treated in the same way. Taking off one-fourth for compensation, the proposed new reservoirs at Crookfoot and Dalton Piercy would give the Company 393,834 gallons and 505,519 gallons respectively, or a total extra supply for trade purposes of 899,353 gallons per day. It was expected that this quantity would keep the Company going for ten or twelve years. In order to obtain the capital for these works, the Company now came to Parliament. So far as he knew, there was no complaint that the Company had not done their duty exceedingly well in the past. It was perhaps the duty of corporations to watch water companies, and there was nothing therefore to complain about in the fact that the Corporation of West Hartlepool were one of the petitioners against the Bill. But in this case there were two Corporations affected, and only one of them were opposing. Dealing with the points raised in the petition of the Corporation of West Hartlepool, Counsel said that the charges there complained against as too high were those authorized by Parliament. Both with regard to water and to gas the Company were charging below their maximum. The allegation that their sources of supply were liable to pollution was to some extent true, because they had had to give up 645 acres of their Hurworth drainage area on that account. But even if the sources were liable to pollution it did not matter, as the water was only used for trade purposes, and was never mixed with the domestic supply. With regard to gas, while the Company were only obliged to give 14-candle power, they were as a matter of fact supplying gas of nearly 16-candle power. They were authorized to charge 5s. per 1000 cubic feet; but they were actually charging only 2s. 4d. Counsel contended that there was no precedent for the insertion of the purchase clause in the Bill of a company such as this. There was a half successful attempt to insert such a clause in the Reigate and Redhill Gas Bill; but that Bill had been withdrawn on the decision of the House of Lords Committee. In that case, he had admitted, as he was prepared to admit in this, that when a non-statutory company came before Parliament the rule was to insert the Cowes clause allowing the local authority to promote a Bill for the purchase of the undertaking, and binding the company not to oppose. But he had maintained, and he still stuck to it, that there was no precedent for inserting such a clause in the case of a statutory company, against whom there was no complaint, coming to Parliament for further powers. If a statutory company who had obtained their powers from Parliament were doing their duty, they were protected by the general law; and he asked equal protection for such a company from a Committee of Parliament. Section 51 of the Public Health Act conferred upon every local authority, corporation, or district council the right to supply water within their own district, and for this purpose to construct works or contract with any person; or the local authority could, with the consent of the Local Government Board, purchase existing works. Section 52, however, laid it down that no local authority should supply water or construct works in the district of a statutory company while the company were able and willing to properly and efficiently supply water for all purposes. Exactly similar provisions existed in section 161 of the same Act, with regard to gas.

The only protection a non-statutory company had was that, unless the local authority could erect the works out of the rates of a particular year, they could not borrow money without the consent of the Local Government Board. Up to the present, the Local Government Board had not allowed local authorities to raise money unless they bought out the existing company. This was a perfectly fair arrangement. But a statutory company was the creature of Parliament, protected by section 52 of the Public Health Act with regard to water, and by section 161 with regard to gas. If the Company were doing their duty, they ought to be allowed to continue in existence; if they were not doing their duty, let them be swept away by all means. But it was altogether unfair and monstrous, merely because a statutory company were in Parliament asking to be allowed to raise money to do their duty, to attempt to force into their Bill a clause compelling them to sell their undertaking to the local authority. Here there were two Local Authorities concerned; and he did not think the Committee would authorize one of them to purchase the undertaking over the head of the other, who did not desire to purchase. He therefore asked the Committee to refuse a purchase clause in this case, which was the case of a statutory Company, against whom they would find there was no complaint, coming to Parliament under necessity in order to obtain capital for new works to supply more water. He saw no tendency or principle in the legislation affecting gas and water companies to hand them over to local authorities. If there were such a principle, it would be given effect to in a Public Bill, and not be left to the haphazard legislation of a Private Bill. Counsel characterized the complaints made against the gas in the petition of the Corporation as an attempt to turn a purely Water Bill into a Gas Bill. He asked the Committee, seeing that the Company came to Parliament for water purposes alone, to exclude evidence as to gas.

The Committee, however, decided to take such evidence.

Witnesses were then called to show that the great increase in the manufacturing interests of the district made a further supply of water for trade purposes absolutely necessary, and that the Company had made several reductions in their charge for gas, which now stood at 2s. 4d. per 1000 cubic feet, less 10 per cent. to large consumers. Among the witnesses were Mr. W. H. Fisher, J.P., a Director of the Company; Mr. John Hunter, a Magistrate and Alderman of the borough of Hartlepool; Mr. John Horsley, a member of the Hartlepool Town Council; and Mr. Thomas Trewhitt, Secretary of the Company. The expert witnesses called in support of the Bill were Mr. T. Bower, Assoc.M.Inst.C.E., the Company's Engineer; Mr. G. J. Symons, F.R.S.; Mr. T. Fenwick, M.Inst.C.E., Consulting Engineer to the Company; Mr. G. H. Hill, M.Inst.C.E.; Mr. James Mansergh, M.Inst.C.E.; Mr. Corbet Woodall, M.Inst.C.E.; and Mr. George Livesey, M.Inst.C.E. Their evidence went to show that the scheme put forward by the Company was practicable and necessary in the interests of the manufacturing establishments in the district. Mr. Fenwick thought the proposed additional capital might be reduced to £100,000. It was admitted that the water proposed to be brought into the town was not suitable for domestic supply; but it was stated generally that there was no danger to the domestic consumer if the trade and domestic supply systems were kept separate. Mr. Livesey said the adoption of the sliding-scale would be no advantage to the consumers of gas in this district, because the price charged by the Company had nearly reached the minimum at which gas could be made. It was in the interests of the Company to give sufficient pressure to supply the consumers properly. The pressure clause was not practically operative, because gas companies generally gave a greater pressure than was really compulsory.

Evidence was then taken in support of the petition of Mr. Wilkinson, part of whose land the Company proposed under the Bill to acquire compulsorily. This went to show that Mr. Wilkinson had spent a large sum of money in improving the Crookfoot part of his property, and had proposed to build a residence near the contemplated reservoir. Mr. E. M. Eaton, Assoc.M.Inst.C.E., submitted a plan for the enlargement of the existing reservoir at Hurworth Burn. In his view, the Hurworth reservoir was not large enough to deal with the water already available on its drainage area; and that its extension would obviate the necessity for taking Mr. Wilkinson's land.

Mr. Pember, for Mr. Wilkinson, contended that the enlargement of the Hurworth reservoir was feasible, and that there was no reason to disturb his client. No objection was, however, raised to the Dalton Piercy reservoir which it was proposed to construct on another part of Mr. Wilkinson's property.

Some discussion arose on an analysis of the water for domestic purposes which was handed in by the Secretary of the Company; Mr. Worsley Taylor, for the West Hartlepool Corporation, formally raising the point that they were entitled to go into the question of the fitness of the pumped water for domestic supply. Counsel argued that, unless they were allowed to do so, the Committee would not have the whole case before them. The Chairman ruled that, as the point had not been specifically set out in the petition, the Committee could not hear evidence on this question. Mr. Worsley Taylor argued that the scheme put forward by the Company was financially bad for the consumers, especially of the domestic water. The proposed expenditure would not benefit them at all, but would take away the chance they now had of a reduction in the charges. It was dangerous to have the two systems existing side by side, especially as the promoters had it in their minds that if at any time the domestic supply became deficient, they might supplement it from the trade supply. Counsel quoted the case of Felixstowe, where the Corporation, in spite of the ratepayers, who did not wish the purchase of the undertaking, opposed the Bill of the Water Company when they came to Parliament for statutory powers. In that case the Corporation were successful in securing the insertion of the Cowes clause. Mr. Baggallay remarked that the Felixstowe Company were in their swaddling clothes; having only been formed a year previously to coming to Parliament. Mr. Worsley Taylor said it was in accordance with public policy that this undertaking should be transferred to the public authority; and he asked for the rejection of the Bill, or failing that the insertion of a clause enabling one Corporation to come to Parliament for compulsory purchase, if in the meantime the Corporation of West Hartlepool and the Corporation of Hartlepool did not come to an agreement to promote a Bill jointly.

For the Corporation of West Hartlepool against the Bill, the expert witnesses were Mr. G. F. Deacon, M.Inst.C.E., and Mr. D. D. Wilson, General Manager to the Stockton and Middlesbrough Water Board, who were called to show that the soft water was liable to contamination, and unfit for domestic use. Although the soft water was necessary for trade purposes, they thought the existence of the two systems side by side was dangerous. Mr. Deacon said he had drawn samples of the two waters from taps; and they were practically indistinguishable in dry weather. The only objection against the limestone water was that it was a little hard. He thought the supply of soft water to the stand-pipes in the town dangerous, because workmen were notoriously careless, and would drink from them. Mr. T. E. Hill, M.B., Medical Officer of Health for the County of Durham, gave evidence as to two cases of typhoid, one of which he had traced to a farm supplied with trade water. Mr. J. W. Brown, Assoc.M.Inst.C.E., Borough Engineer and Surveyor of West Hartlepool, said he had made verbal complaints to the Company about insufficient pressure of water. Mr. J. F. Wilson, Mayor of West Hartlepool, and Mr. M'Farlane, J.P., a member of the West Hartlepool Town Council, also gave evidence as to the desire of the Corporation to purchase the undertaking of the Company, although the purchase had not been formally sanctioned by the ratepayers. The latter gentleman admitted, in cross-examination, that all they wanted was a proper supply on reasonable terms, and that the proposal was only to purchase the water undertaking of the Company.

Summing up the evidence, Mr. Balfour Browne said he hoped to be able to show that, in the words of the last witness, the Company were giving, and were prepared to give, a good and proper supply on reasonable terms. There had been an attempt to throw dirt into the domestic supply. He desired at once to repudiate the suggestion that the domestic supply was not a proper one, and to say the Company were quite prepared to defend it, and to show that it was. The Bill sought powers to supplement a deficient trade supply. There had also been an attempt to differentiate between the trade and the domestic supply; but upon the trade of the town the people depended for their sustenance. If the trade dwindled, the population must pass away. The Mayor of West Hartlepool had told the Committee distinctly that he would not say the water they were proposing to introduce was not good enough for trade purposes. It was not the fault of the Hartlepool Water Company if workmen chose to go to the stand-pipes and, out of pure "cussedness," drink the water supplied for trade purposes only. The Company were prepared to cut off the trade water, which had been laid in a few cases to private houses for baths. That the water was good enough for trade purposes was admitted; and that further water was required for trade purposes was proved by the fact given in evidence, that the Company had last year to supplement their trade supply from the magnesian water. The Committee could not, upon an inquiry such as this, say that the charges were unreasonable. It was upon the strength of those charges that the shareholders had subscribed the capital. Possibly they were high, he did not know; but there was no proof of it in the evidence which had been given. If the Bill were rejected, the charges would remain the same, because they were those which had been authorized by previous Acts of Parliament, which could not be repealed by the rejection of the Bill. There was no case on record where a purchase clause had been forced upon a statutory company without their assent. Counsel criticized the alternative scheme put forward by Mr. Eaton; and said that the other side had treated his clients very unfairly in not cross-examining their witness upon an alternative scheme, and then after their mouths were closed bringing one forward themselves. With regard to the capital, he agreed with Mr. Fenwick that it was a little too large, and that £100,000 would be amply sufficient. The only advantage to the Company of a large capital was to keep them longer out of Parliament with such applications as these, which, however gratifying to Counsel, were an expense to the Company which had ultimately to come out of the pockets of the consumers. It was, however, a wholesome rule that companies should be obliged to come to Parliament every ten or fifteen years. If the West Hartlepool Corporation wanted to purchase, the only right course was to join with the Hartlepool Corporation and promote a Bill for the purpose.

After a short adjournment, the Chairman announced the decision of the Committee as follows: "That the preamble of the Bill is proved to the satisfaction of this Committee. The Committee are of opinion the additional capital raised under the Bill should be £80,000, with borrowing powers of £20,000; that a clause be inserted in the Bill to restrict the additional supply provided by the Bill to trade purposes only; a clause to be inserted to provide that notice should be given by the Company to the Corporations on the occasions when it is necessary to supplement the trade supply from the domestic water supply; that the candle power of the gas be raised to 15 candles."

The Committee adjourned the consideration of the clauses. When the Bill again came before them, clauses were introduced embodying their recommendations and some minor modifications agreed upon. For the Corporation of West Hartlepool, Mr. Lloyd asked for the insertion of the following new clause 29A, entitled "Provisions as to auction to apply to borrowed money":—

The provisions of this Act with respect to the offering of new shares or stock for sale by auction or tender, shall apply, *mutatis mutandis*, to the issue of all debentures and debenture stock, and to the granting of mortgages by the Company under the powers of this Act.

Mr. Balfour Browne said that although the clause was unusual, and in his view useless, he had no objection to it; and it was therefore incorporated with the Bill. The Company also accepted an additional clause providing that if at any time they, after twenty days' notice being given to them requiring them to put any of the gauges or works in a proper state of repair and condition, failed to do the work, any person interested in the proper flow of the compensation water could cause the said gauges or works to be placed in fit condition, and recover the full cost of so doing from the Company by legal process.

The Chairman subsequently presented to the House the following report of the Committee: "That a report from the Local Government Board was laid before the Committee and considered by them, and they have made provision in the Bill to give effect to the recommendations contained in that report so far as seemed desirable to the Committee; more particularly as to clause 2, by making debentures and debenture stock subject to the provision in the Bill for offering shares by auction. As to clause 4, they found that the promoters were in accord with the Authorities in charge of the roads and footpaths. That a supplemental

report from the Local Government Board as to the importance of preserving the sources of water supply from pollution had been laid before the Committee and considered by them; but, pending the settlement of a clause of general application for insertion in all Water Bills of the present Session, and in order to secure uniformity of treatment, the Committee had deemed it desirable to leave the Bill as it stands for the present, with a view to the insertion of a general clause at a later stage of the Bill. The Committee further add that the object of the Bill is only for the supply of water for other than domestic purposes, and that the existing supply for domestic purposes is derived from deep borings in the magnesian limestone."

HOUSE OF COMMONS COMMITTEE.

(*Before Mr.* A. H. Brown, *Chairman, Sir* J. Woodhouse, *Mr.* Bathurst, *and Mr.* Brigg.)

The above-named Committee proceeded on the 24th ult. with the consideration of the

FRODINGHAM GAS BILL.

By this Bill the Frodingham Gas Company, which was formed in 1865, by the owners of the Frodingham Iron and Steel Works, for the manufacture of gas for their own consumption, but which since the year 1870 has been supplying by request the inhabitants of Scunthorpe and Frodingham, sought to be incorporated, with statutory powers to enable them to purchase the gas undertaking, and supply gas in the parishes named. The capital proposed to be raised was £18,000—£10,000 at 10 per cent., and £8000 at 5 per cent.; and it was intended to erect additional works on a site of 2½ acres, of which they had the option of purchase, and to extend and lay down fresh mains for affording in the future an adequate supply. There were two petitions against the Bill—one being from the Scunthorpe District Council, and the other that of the Brumby and Frodingham District Council. These bodies opposed on the grounds that the Company's works were ill adapted for the public supply of gas; that the Councils were desirous of taking this work into their own hands; that they had endeavoured to come to terms with the Company for the purchase of part of their gas undertaking, but had failed to do so; and, further, that it was the unanimous desire of the inhabitants that the Company should not continue to supply them. They also objected that if the gas-works were established as a statutory concern the Councils would be deprived of the powers of supply they had under the Public Health Act.

The case for the Company was conducted by Mr. Balfour Browne, Q.C., Mr. Worsley Taylor, Q.C., and Mr. Squarey; that for the Scunthorpe District Council by Mr. Littler, Q.C., Mr. Reader Harris, Q.C., and Mr. W. Shakespeare; while the Brumby and Frodingham District Council were represented by Mr. J. D. Fitzgerald, Q.C., and Mr. Ram.

It was contended for the Company that they had been supplying the districts at the special request of the inhabitants for thirty years; that the demand was increasing; and that, in view of future requirements, the present works being insufficient, the Company wished to be protected by statutory powers before expending any further capital on the erection of improved and extended plant. The Local Authorities had been carrying on negotiations in regard to the Company's gas undertaking; but their proposals had fallen through, as they had only offered to purchase the mains and pipes, and had always refused to buy the works. The Company were quite willing to sell; but they insisted that the Local Authorities should buy the whole of their undertaking, and not merely the mains and pipes, leaving on their hands the works, which would be useless to them. They urged that no local authority in this country had ever been allowed to exercise their powers under the Public Health Act unless they were prepared to buy out the existing gas company. The Company were quite willing to insert in their Bill the Cowes clause, which would give the Local Authorities power to purchase the undertaking upon arbitration terms. Of the £18,000 capital proposed to be raised, £4000 was to be handed over to the owners of the existing works; and this sum, together with £1000, the cost of establishing themselves, they intended to call the first capital, to bear 10 per cent. interest. They asked to be allowed to raise a further £5000 at 10 per cent., also to be treated as original capital, making £10,000 in all; the remaining £8000 to be raised at 5 per cent.

The first witness called in support of the Company's case was Mr. R. Hopkins, of Messrs. Scatcherd, Hopkins, and Middlebrooks, Solicitors, of Leeds, who instructed the promoters. He gave evidence as to the great desirability of the Company being armed with statutory powers if they were to go on supplying gas and extending their mains. The proposed way of dealing with the capital was, in his opinion, a very proper one—in fact, the only way, having regard to the working-class character of the district; and he did not consider the auction clauses should be applied. He did not think the Local Government Board would grant the Councils powers of supply until they had bought up the undertaking of the Company. Mr. W. Dewhurst Cliff, one of the three owners of the iron-works, was the next witness. He said they were not anxious to supply the parishes with gas. The Local Authorities could do it if they pleased; but they must first purchase the whole of the Company's gas plant and works, not take what they wanted, and leave what they did not require. This would be most unfair, in view of the fact that the Company had been supplying gas for so long a period, and at the Council's request.

At this point the Committee expressed the opinion that, if Counsel on both sides were to have a consultation, a satisfactory arrangement might be come to. They accordingly adjourned for this purpose.

On the resumption of the hearing, the following day, Mr. Littler said he was prepared, on behalf of Scunthorpe, to purchase all the mains and pipes of the Company, but not the works; and they would undertake to apply for powers next session to supply—the Company to withdraw their Bill, and bind themselves not to oppose that of the Council. Mr. Balfour Browne characterized the offer as ridiculous, and asked if this was also the proposal of Frodingham. Mr. Fitzgerald replied that only a small portion of Frodingham was supplied; and the Council were prepared to buy the mains in their district on the same terms. Mr. Balfour Browne said the proposal was a most unfair one. Mr. Littler replied that it was the only offer he could make, and if his friend refused it they must go on. Mr. Balfour Browne said he desired to bring up a clause for which dozens of precedents existed, whereas none could be found for Mr. Littler's. The Chairman thereupon decided that the hearing must be proceeded with.

The Vicar of Frodingham (Rev. E. M. Weigall) then gave evidence in support of the scheme. He was followed by Mr. Mannaberg, the Manager at Messrs. Cliff's works. He stated that gas had been supplied to all who required it. No complaint had been received as to the quantity, the quality, or the pressure of the gas. Of the total quantity made, 25 per cent. was used in Frodingham, and 75 per cent. in Scunthorpe. The price to be paid was to be decided entirely by an arbitrator; and the gas-works could be separated from the iron-works.

Engineering evidence was next submitted. Mr. Corbet Woodall, M.Inst.C.E., said it would have been desirable if separate accounts of the gas undertaking had been kept; but it was not surprising out of the 6 million cubic feet of gas made annually, that half a million were consumed in the works. He considered it reasonable to ask for £10,000 capital. New works would shortly have to be built; and there was no prospect of a proper return. In his opinion, 10 per cent. was a fair price for this to be raised at; and 5 per cent. for the remainder of the capital—£8000. He should be quite prepared to say that £4000 was a reasonable sum to have spent on the works originally. They were not of a first-class order, being somewhat antiquated; but this would be remedied if the promoters obtained the powers sought. In 1870, the Company charged 7s. per 1000 cubic feet; the price was now 4s. 2d., which was reasonable. Questioned as to a proposal that the undertaking should be purchased for £5000, which would include £1000 for the expenses of coming to Parliament, together with the outlay incurred in winding up the Company, witness said it was a fair sum; but the arbitrator would decide as to the value of the works. In cross-examination he said it was an unworthy suggestion to make that the Bill was promoted in order that the Local Authorities might purchase the undertaking at an enhanced value. The Local Government Board made it an invariable rule that when local authorities wished to take over the gas supply of their districts, they should first buy up the existing works. Mr. Woodall was followed by Mr. C. Gott, M.Inst.C.E., who spoke to the general condition of the works.

At this point the Committee again expressed their feeling that the matter before them was essentially one for compromise. The parties thereupon consulted once more; and after a lengthy discussion, the following offer was made by Mr. Littler on behalf of the Scunthorpe District Council: (1) The Bill to be withdrawn. (2) The Council to pay £500 towards the promoters' costs of their application. (3) The Council to apply to Parliament next session for statutory powers for the supply of gas to the district, and the application not to be opposed by Messrs. Cliff. (4) The Council to purchase, within two years of the time of their getting the necessary powers, all the mains and pipes at their then value as working plant; Messrs. Cliff to be paid the full value of all works now in existence which an independent engineer, to be appointed by the Local Government Board, may say have been thrown away or become useless to them by reason of the purchase.

Mr. Fitzgerald intimated that the Frodingham District Council had agreed to contribute £100 towards the £500; it being distinctly understood that they were left in a perfectly independent position either to obtain their gas from Scunthorpe, or to apply for statutory powers to take their supply into their own hands. Mr. Littler perfectly concurred in this. Mr. Balfour Browne accepted the proposal on behalf of the Company; and the Bill was withdrawn.

Gas and Electric Lighting at Leigh (Lancs.).—At a recent meeting of the Leigh District Council, the minutes presented by the Gas Committee stated that the Gas Visiting Committee had reported that they had considered the report of the Gas Manager (Mr. J. Foster) on certain proposed alterations and extensions at the works, and recommended that it be approved, and that the Clerk be instructed to apply to the Local Government Board for sanction to borrow £25,000 for the purpose of carrying out the extensions, and that the plans and estimates be submitted to a gas engineering expert for consideration and report. A report by the Manager, on the subject of the erection at the gas-works of plant for the supply of electricity in the compulsory area prescribed by the Leigh Electric Lighting Order, 1895, together with an estimate of the cost, had been considered by the Visiting Committee, who reported that they had visited the electricity works at Nottingham, Chester, and Stafford, and recommended that the Manager be instructed to prepare detailed plans and estimate for the erection of an electricity supply station at the gas-works, and the laying down of an installation on the lines proposed in his report, at a capital outlay of £10,000. It was resolved that the recommendation be adopted. A resolution that all the expenses of lighting the public streets should be charged on the general district rate, and that as from April 1, 1898, the gas profits made in any year in excess of £1500 should be applied towards the reduction of the price of gas, was submitted; but its consideration was deferred.

The Inspection of Water Supplies.—At the meeting of the Association of Municipal Corporations on the 26th ult., the following resolution was passed, and referred to the Council for further consideration: "That inasmuch as outside the Metropolis, and except in regard to wells and pumps, sanitary authorities possess no executive powers for the protection of public water supplies in the hands of water companies, whereas the consumers of flesh, milk, and other foods are safeguarded by statute, it be referred to the Council to initiate or procure legislation whereby every sanitary authority supplied by a water company which is not also a sanitary authority be empowered to authorize any duly appointed official to enter, inspect, inquire, and take samples at any part of any source or works of water supply or water purification, at any time by day or night, and whereby also such water company shall be required to afford all reasonable facilities and information for such inspection, inquiry, and sampling." The resolution was proposed by the Town Clerk of Stockport (Mr. Walter Hyde). It appears that this town is taking the lead in a movement to obtain greater powers of sanitary control and supervision of water supplies. Acting, it is presumed, under their advice of the Medical Officer of Health (Dr. C. Porter), the Town Council recently passed a resolution in similar terms to that quoted above. Copies of the resolution were transmitted to 114 corporations and district councils supplied by private water companies, with a request that they should support it at the meeting of the Association of Municipal Corporations.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Monday, March 28.

(*Before Lords Justices* A. L. SMITH *and* COLLINS.)

Regina v. Leigh Rural District Council—Question as to the Making of a Retrospective Rate.

This was an appeal from an order of a Divisional Court, consisting of Justices Day and Lawrance, making absolute a rule for a writ of *mandamus*. The facts were shortly as follows: An agreement was entered into between the Tyldesley Urban District Council and the Leigh Rural District Council on Jan. 24, 1893, whereby the former Council were to furnish a supply of water to the latter. They were to supply a minimum of 75,000 gallons in each week, at a fixed cost of £146 per annum. The Leigh Council were to be at liberty to take a greater quantity of water on paying an extra charge. Under the agreement, the supply of water commenced on July 17, 1893, and was continued, so far as it was material to the present case, down to May 6, 1895. The Tyldesley Council were to put up a water-meter, and keep it in repair, in order to ascertain the exact quantity of water supplied. On the 6th of May, it was found that the meter was registering wrongly. The result was that the Leigh Council were bound to pay a very much greater amount than they would have done for 75,000 gallons at the rate of £146 per annum. It was discovered by the Leigh Council that the water had been running to waste owing to a leak in the pipes, so that the extra water which had been supplied became useless to everybody. The Tyldesley Council demanded from the Leigh Council the amount of the charge for the extra water which had in fact passed through the meter. The Leigh Council denied liability, and paid £50 to the Tyldesley Council; stating that this sum would be sufficient to meet their claim. There was a balance of £92 which it was alleged was still owing to the Council; and on March 9, 1897, the Council commenced proceedings to obtain payment of the amount. The Leigh Council admitted the claim, but counter-claimed for breach of agreement to keep the meter in order. The Tyldesley Council paid £30 into Court in respect of the counter-claim; and this was eventually ordered to be set off against the plaintiffs' claim. On May 15, 1897, the Tyldesley Council obtained judgment for the balance; amounting altogether, with interest and costs, to £63 13s. 5d. The rule in question was applied for on Oct. 25, 1897, and made absolute on Jan. 18, 1898. The Leigh Council contended that they had no means to pay the judgment debt; that they could not in respect of the original claim levy any rates to pay it, because such rates would be necessarily retrospective; and that their having submitted to judgment, having no real defence to the claim, made no difference.

Mr. MACMORRAN, Q.C., and Mr. TINDAL ATKINSON appeared for the appellants; Mr. M'CALL, Q.C., and Mr. HORRIDGE for the respondents.

Lord Justice SMITH said the question was whether, where a just debt was due from a Rural District Council, and the Council had no funds, and would not levy a rate to pay the debt, it was necessary that a *mandamus* should be moved for within the rating year, or otherwise the creditor would have to go without his money. It seemed to him that it would be, he would not say monstrous, but wrong, if the law was such that the answer to this question must be in the affirmative. He thought the true answer was "No." The appellants said that the *mandamus* called upon them to make a retrospective rate for the purpose of paying a debt which became due on May 6, 1895. But a debt was not due till it was ascertained; and this debt was not ascertained till May 15, 1897. The *mandamus* was moved for in October, 1897; it was therefore moved for well within the rating year. But, in his opinion, there was no hard-and-fast rule preventing the granting of a *mandamus* in a case where the rating year had expired. He thought that in such a case excuses might be given explaining the delay which had occurred; and in the present instance there was ample excuse for the delay which had occurred before the action was brought. The *mandamus*, therefore, had been rightly granted; and the appeal must be dismissed.

Lord Justice COLLINS delivered judgment to the same effect.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Friday, April 1.

(*Before Lords Justices* A. L. SMITH, CHITTY, *and* COLLINS.)

Tyldesley-with-Shakerley Urban District Council v. Atherton Urban District Council.

This was an appeal from a judgment of Mr. Justice Kennedy in an action tried at the Liverpool Assizes last August without a jury.* The Tyldesley-with-Shakerley District Council claimed £133 9s. 3d., with interest amounting to £7 8s. 10d., for water supplied by them to the Atherton Urban District Council under an agreement dated July 2, 1868. The defendants counter-claimed for breach of contract, and for the cost of laying down new mains and erecting a meter-house, &c., to the extent of £1250. At the trial, judgment was given for the plaintiffs on the claim and counter-claim. The defendants appealed.

Mr. PICKFORD, Q.C., and Mr. SUTTON appeared for the appellants; Mr. M'CALL, Q.C., and Mr. HORRIDGE represented the respondents, but were not called upon.

Lord Justice SMITH, in giving judgment, said the claim was for water-rent payable to the plaintiffs under an agreement dated July 2, 1868. That the money was due under the agreement there could be no mistake; but the Atherton District Council counter-claimed, and alleged that under the agreement they were entitled to a supply of water from the Tyldesley-with-Shakerley District Council at a pressure sufficient to carry it to the top storey of any house within the limits of the district. The question was whether or not there was in the agreement a contract by the plaintiffs to supply water at a certain pressure. Section 35 of the Water-Works Clauses Act, 1847, seemed to him only to put an obligation on suppliers of water to deliver it at high pressure for domestic purposes. It seemed to him quite plain that the plaintiffs had supplied the water to the full extent under the contract—8,800,000 gallons—and that there was no obligation on the Tyldesley Council to supply it at high pressure to Atherton. In his opinion, the learned Judge in the Court below was right in his judgment; and the appeal must be dismissed, with costs.

Lords Justices CHITTY and COLLINS concurred.

* See "JOURNAL," Vol. LXX., p. 333.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Friday, April 1.

(*Before Mr. Justice* STIRLING.)

Thornton v. Shipley Gas Company—The Removal of Spent Lime.

Mr. BUTCHER, Q.C. (with him Mr. BARDSWELL), said he had to mention a motion which was before the Court some time back for sequestrating the property of the defendant Company for breach of an injunction. An order was made by consent restraining the Company from depositing gas lime over their lands so as to occasion a nuisance. The case was a rather peculiar one. It was quite clear, from the gentleman who, at the instance of the Court, had made a report, that a very serious nuisance had been committed; but he was doubtful whether it was caused by any act which constituted a technical breach of the injunction. The order was made on the 5th of May, 1897, and on the 21st of July the motion to sequestrate was made—a very considerable amount of evidence being filed. The plaintiff's evidence went to show that there was a most offensive odour caused by the operations of the defendants; while the witnesses upon the other side said that there was no nuisance at all, either in taking the lime out of the purifiers or depositing it on the land, but that the smell (if there was any) came from the purifiers when they were opened for the purpose of removing the lime from them. Mr. Willcox, the Manager, stated that the smell from the purifier was such as not to occasion any annoyance. The Court, however, thought there was a nuisance of some sort, and they appointed Dr. Kaye, the Medical Officer of Health for the West Riding, to inquire and report (1) whether any nuisance was caused to the plaintiff by the defendants when the spent lime was being removed from the purifier; (2) whether the nuisance was caused by the mode in which the lime was removed and deposited with regard to any smell proceeding from the purifying-house itself; and (3) what steps, if any, should be taken to remedy the nuisance. Dr. Kaye had reported that a nuisance was caused to the plaintiff during the time the spent lime was being removed from the purifier, but not by the mode in which it was conveyed from the door of the purifying-house to the place of deposit. The question now arose whether technically there had been a breach of the injunction. It also appeared from the report that the Company were taking steps to stop the nuisance by introducing a new process of purification.

Mr. UPJOHN, Q.C. (with him Mr. WOODS), said the new method referred to had been in operation since the 18th of February.

Mr. BUTCHER said the question really was, who should bear the costs of the motion. Having regard to the fact that the nuisance had existed, he asked that the defendants should pay the costs.

Mr. UPJOHN contended that, as the greater portion of the evidence had been directed to an entirely irrelevant issue, the defendants ought not to be saddled with the costs.

Justice STIRLING said he had come to the conclusion that there was no nuisance caused to the plaintiff by any act in respect of which the defendants were restrained, and consequently the motion failed. The general costs of the motion would be paid by the plaintiff. He thought a real issue had been raised as to whether there was a nuisance at all; and as this had been found against the defendants, they must bear the costs of the motion so far as they had been increased by this issue—the costs payable by the defendants to be set off against those payable by the plaintiff.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Wednesday, March 30.

(*Before Justices* DAY *and* BRUCE.)

Ward v. The Plymouth and Stonehouse Gas Company.

This was a motion which had been restored to the list after an inquiry before the Official Referee. The facts will be in the recollection of our readers. The plaintiff brought an action claiming damages in respect of an alleged nuisance; and the defendants, who said the nuisance, which had once existed, had abated, submitted to an injunction and an inquiry as to damages. This inquiry took place in April, 1896, and resulted in terms being agreed. In December of that year, the plaintiff moved for a writ of sequestration against the Company for disobedience of the injunction; when an order was made directing the Official Referee to inquire (1) whether any nuisance had existed since the previous inquiry in April, 1896, or since Oct. 24, 1896, (2) whether the defendants had abated the nuisance wholly or partially since those dates, and (3) whether the plaintiff had sustained any, and what, damage since April. On the third question there was this direction: "This question not to be proceeded with, if possible, until after the question of nuisance has been decided." After an inquiry extending over three weeks, the Official Referee found that the nuisance had not existed since the last inquiry or since Oct. 24, and that the nuisance had been wholly abated since the date of the last inquiry.*

Mr. DUKE, who appeared for the defendants, said, as these findings were absolutely in their favour, it became unnecessary to go into the third question; and he now asked that the motion to sequestrate should be dismissed, and the plaintiff ordered to pay the costs.

Mr. GRAHAM, for the plaintiff, contended that the finding of the Official Referee was against the evidence, and also against the actual admissions of the defendants.

Mr. DUKE remarked that if the plaintiff intended to appeal against the award, he must take the proper steps for doing so.

* See "JOURNAL," Vol. LXIX., p. 1141; Vol LXX., pp. 47, 117, 331.

Mr. GRAHAM said this being merely a report to the Court, the practice was to raise the point when the Court considered it.

Mr. DUKE observed that the report was made before the Long Vacation, and the time for appealing had expired.

Mr. GRAHAM said he could not move to set aside the report until the present application was made.

Justice DAY thought that either party, if dissatisfied with the report, might have taken steps to set it aside.

Mr. GRAHAM pointed out that the Official Referee had not gone into the question of what damages plaintiff had suffered since the last inquiry.

Justice DAY said this was because there was nothing to inquire into. If there had been no wrong done, there was no need to proceed with the inquiry.

Mr. GRAHAM said it was admitted that until the defendants covered in the coke-yard there was a nuisance to the plaintiff. He would ask for leave to give notice of motion to upset the award.

Mr. DUKE opposed the application, and cited the decision of Mr. Justice Stirling in the case of Fitton, as showing that leave would not be granted at so late a stage.

Justice DAY said the Court were of opinion that the case was clearly within the mischief pointed out by Mr. Justice Stirling, and that they ought not to hear the counter-application to set aside the award, or to accede to the request that the plaintiff should at this late stage be allowed to give notice of motion.

Mr. DUKE asked that the motion to sequestrate should be dismissed, and that the plaintiff should be ordered to pay the costs of the inquiry.

Justice DAY said certainly.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Monday, April 4.

(*Before Mr. Justice* BIGHAM.)

Booth and Others v. The Gaslight and Coke Company—The Company's Coke Contracts with the Cement Makers.

This was an action by a number of firms in the cement trade, claiming damages from the defendants for breach of contract to supply coke.

Sir EDWARD CLARKE, Q.C., and Mr. SHEARMAN appeared for the plaintiffs; Mr. CARSON, Q.C., and Mr. DANCKWERTS represented the defendants.

Sir E. CLARKE, in opening the case, said there were seventeen firms whose names appeared on the pleadings, who were combined together for certain purposes under the name of the Portland Cement Makers' Alliance; but it was not a company.

Justice BIGHAM remarked that he supposed it was a sort of "ring."

Sir E. CLARKE said these firms had been for years customers of the defendants for coke, and from time to time difficulties had arisen as to the prices. The result was that in 1895 no contracts were made, and, as he understood, the defendants were left with a considerable accumulation of coke on their hands. In September, 1896, however, at the time when contracts for coke for the ensuing year were made, negotiations were re-opened, and a long correspondence ensued. The result of this was that a firm contract was made for the supply of 150,000 tons to the plaintiffs, to be distributed among them according to a list furnished by Mr. Leonard, who acted as their Secretary; and it was also stated by the defendants that "should the increase in the Company's business between now and the end of the year enable the Directors to do so, they will give you the refusal of a further quantity of coke, not exceeding 50,000 tons." It was agreed that the words "the end of the year" meant the 31st of December; and the plaintiffs contended that there had been a considerable increase in the business of the Company; that the defendants could have supplied the further 50,000 tons, because they had sold 40,000 tons to other persons buying for the plaintiffs, at 9s. a ton; and that the plaintiffs therefore were entitled to the option which had been conditionally offered them.

Mr. DANCKWERTS pointed out that though there had been an increase in the quantity of gas sold during the three concluding months of 1896, there had been no increase in the quantity of coke produced, owing to a larger use of carburetted water gas and oil gas for enrichment.

Sir E. CLARKE then read a great number of letters which had passed between the parties, both leading up to the contract, and also subsequently, when the plaintiffs were pressing to have the increased quantity of 50,000 tons of coke, which was terminated by the decision of the defendants that they were not in a position to offer the additional quantity at the contract price, but were willing to let plaintiffs have a portion of the 100,000 tons reserved for ordinary customers at 9s. per ton. He said he had only one witness to call to prove the damages.

Mr. *Harry Keep*, dealer in coke, said in October, 1896, he bought coke from defendants at 8s. under a contract. In March, 1897, he received instructions from Mr. White to purchase some for plaintiffs, and bought 30,000 tons from Beckton for delivery up to September, 1897. He paid 9s., and charged plaintiffs 1d. a ton commission. This was outside his ordinary contracts and dealings with defendants. He also purchased later some further coke at a higher price from other sources.

By his LORDSHIP: He did not think it wise to try and buy more than the 30,000 tons from Beckton.

Examination continued: He bought a further 5000 tons odd at prices varying up to 9s. 9d. per ton.

Sir E. CLARKE said he was willing to admit that plaintiffs might have purchased the 40,000 tons from the defendants at 9s. The damages might be calculated at 1s. a ton on 40,000 tons.

Cross-examined: He was a regular customer of defendants. If he obtained special orders for larger quantities than he had arranged for in the autumn, he went and made a special contract.

Re-examined: He made his contracts with the defendant Company in September or October. In 1896, he contracted for a much larger quantity than in the previous year.

This concluded the plaintiffs' case.

Mr. CARSON said it was necessary each August for the defendant Company to make an estimate of the amount of coke to be produced during the coming year. In August, 1896, the estimate was made in the usual way; and it amounted to 450,500 tons. They then sent out printed forms of tender. Upon the form the Cement Alliance tendered for 360,000 tons; and on the 9th of October the defendants wrote saying such a quantity was outside their power to discuss, but offering the 150,000 tons if accepted at once, and adding that the quantity might be increased at the option of the Directors to 200,000 tons, if circumstances justified it. The mode in which the estimated 450,000 tons was disposed of was mentioned in the letter of Oct. 10. There were the 150,000 tons taken by the plaintiffs, 200,000 tons which were actually tendered for by other people in October, and 100,000 tons reserved for ordinary customers, who purchased from time to time not under contract. Out of this quantity came the 30,000 tons purchased by Mr. Keep in March. There was really no increase in the quantity of the Company's business regarded from the coke-producing point of view; and even if there had been a small increase, he submitted it was a matter for the consideration of the Directors—acting, of course, *bonâ fide*—whether they could offer the extra 50,000 tons to the plaintiffs. There was an increase in the output of coke in August and September; and it was this which led the defendants to refer to the possibility of the quantity on offer being larger; but this arose from exceptional weather in those two months, and was not continued; and in the last three months there was no increase over the previous year, on which the estimate of 450,000 tons was based.

Justice BIGHAM said he understood the making of oil gas and water gas involved a smaller production of coke, and also a larger consumption of it in the works.

Mr. CARSON said that was so; and this explained why, though there was an increase in the gas supplied, there was no increase in the coke. When these figures were proved, he could not see what the plaintiffs' case could rest upon.

Mr. *John W. Field* said that of the average production of coke per ton of coal carbonized, after deducting that used for heating the retorts, boilers, and for other purposes, they had 9 cwt. for sale; and it was on this basis that the estimate was framed. But the 9 cwt. for sale included what was used in making oil gas, in tar and liquor distilling, &c., which were treated as separate departments in the Company's books; and the coke so used was considered as sold to those departments. This explained what might appear as a discrepancy in some of the figures appearing in the Company's reports and statistics. He also explained that, though there was a large increase in the amount of oil gas made at the end of 1896 over that made in 1895, this was owing to a failure of the supply of Russian oil in that year, and was little more than was made in 1894. Oil gas was used for enrichment, and to meet cases of emergency. The 100,000 tons of coke reserved was to meet the demands of regular customers; and Mr. Keep was supplied out of it.

Mr. *Field* was cross-examined at some length by Sir E. CLARKE, on the figures given, on quotations from speeches made by Colonel Makins at the meetings of the Company, and on some of the figures given in Field's "Analysis;" but the only result was to strengthen his evidence-in-chief.

Sir E. CLARKE having addressed his Lordship shortly in reply,

Justice BIGHAM said he must give judgment for the defendants. They told the plaintiffs in October, 1896, that they had to dispose of from 450,000 to 500,000 tons of coke during the coming year, and how it was going to be disposed of. There were 200,000 tons to go to people with whom they had made contracts for forward delivery, 150,000 tons they proposed to give the plaintiffs upon their contract, and another 100,000 tons they told the plaintiffs they intended to keep as a reserve so that they might supply those occasional customers who did not make contracts for forward delivery, but came to them from time to time to have their wants supplied. This disposed of the 450,000 tons which the defendants thought they would have to dispose of during the year. They had, however, reasons—good or bad—for thinking or hoping that possibly their output of coke might exceed 450,000 tons; and they said to the plaintiffs: "If our increase of gas does produce an increase of coke beyond that which we expect, we will let you have the option of taking another 50,000 tons." That was, in his opinion, the meaning of the bargain. The actual words were: "Should the increase in the Company's business between now and the end of the year enable the Directors to do so." "To do so" meant to give the plaintiffs the refusal of a further quantity of coke; and how could the increase of business enable them to do this unless the business referred to was that kind of business which produced coke? In his opinion, this contract referred specifically to the coke-producing part of the defendants' business; and it meant: "If, in the making of coal gas, we produce more than the 450,000 tons upon which we based our arrangements for the coming year, we will then give you the option." Inasmuch as the figures satisfied him that, in the last three months of 1896, there was not an increase of business in this particular part of the defendants' works such as would enable the Directors to enter into an obligation to deliver more than 450,000 tons, he did not think the circumstances ever arose which called upon the defendants to give the plaintiffs that which otherwise they might have been entitled to. He must therefore give judgment for the defendants, with costs.

Fire at Messrs. Parkinson's.—Last Wednesday morning, about four o'clock, a fire broke out on the premises of Messrs. W. Parkinson and Co., in Cottage Lane, City Road. Owing to the use of fireproof doors, the fire was confined to a warehouse and some small shops above it; and it was extinguished by daybreak. The men are all at work, so that business will not be interfered with in any way.

Rating of the King's Lynn Gas-Works.—Some months since the rating of the works of the King's Lynn Gas Company was increased by the Assessment Committee from £1448 net to £2300 net and £3115 gross. This increase was resisted by the Company. The services of Mr. W. A. Valon, J.P., were retained to advise them and appear before the Assessment Committee. This he did in November last. Since that date negotiations have taken place from time to time, with the final result that the Committee, without appealing to Quarter Sessions, have agreed to reduce the assessment from £3115 to £2353 gross, and from £2300 to £1674 net. The latter figure has been accepted by the Company as reasonable, and a statement has been made on that basis. This results in a saving to the Company of upwards of £200 per annum.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY AND THEIR CONSUMERS.

The Increase in the Price of Gas—Suggested Board of Trade Inquiry.

At the Clerkenwell Town Hall on Monday last week, a conference of delegates from Vestries and District Boards north of the Thames, and within the area of The Gaslight and Coke Company, was held to decide upon some course of action in regard to the increase in the price of gas which the Company have made from the commencement of the current quarter. Sixteen of the Authorities in the area affected were represented, two had decided to take no part in the proceedings, and from the remainder no reply had been received to the invitation to be present, owing presumably to the short notice which was given. Mr. Arthur Millward, the Chairman of the Clerkenwell Vestry, presided.

The Chairman, having referred to the object of the gathering, reminded those present that this was not the first time they had had occasion to protest against the charges of The Gaslight and Coke Company. In 1894, they held a meeting in Clerkenwell in regard to the then high price of 3s. 1d. This, "or some other circumstance," had a little effect; for, in the following June, the price was reduced to 3s., and in July notice of a further reduction to 2s. 10d. was sent out. The South Metropolitan Gas Company at the present time only charged 2s. 3d.; and he was speaking authoritatively when he said that they had no intention of raising the price. On the north side of the Thames, the charge was 2s. 10d.; and The Gaslight and Coke Company had announced their intention of raising it to 3s. from March 25. The difference between the prices on the north and south sides of the river was very great. It might be said that it was no use attempting to do anything, because the Company were protected by Act of Parliament. So they might be; but the voice of the people should be heard, and especially as the increase only affected the private consumers. The price of gas supplied to street-lamps or public bodies could not be higher than the lowest rate charged to the private consumers in the South Metropolitan Company's district. They charged the private consumers 2s. 3d.; and to those customers who used £100 worth of gas in the year, they allowed a discount of 5 per cent., which reduced the price to about 2s. 2d. Hence no thanks were due to The Gaslight and Coke Company for not having raised the price of gas supplied to the street-lamps, seeing that they had no power to raise it above 2s. 2d. The Company had been paying a dividend of 12¾ per cent., which was the most they could share with the price of gas at 2s. 10d. When ordinary business people had to pay higher prices for their goods, they had, owing to competition, to put up with less profits; and he did not see any reason why the Gas Company should not also bring down their profits to a reasonable amount. They insisted, however, in charging one-third more for their gas than the South Metropolitan Company; and this appeared to him to be a monstrous difference.

Mr. W. Irons (Chelsea) moved the first resolution: "That in the opinion of this conference of delegates from Vestries and District Boards within the area of supply of The Gaslight and Coke Company, the time has arrived when a Board of Trade inquiry should be held into the present management and working of The Gaslight and Coke Company, their existing statutory rights, and the past results, financial and general, of the statutory sliding-scale of price and dividend, with a view to putting an end to the existing anomaly, whereby gas consumers on the north side of the Thames have to pay 3s. per 1000 feet as against 2s. 3d. per 1000 feet charged on the south side."

Mr. Tripp (Clerkenwell), in seconding, said he had gone rather deeply into this question in order to find some justification for the increase in price. According to a report of the last meeting of the Company, Colonel Makins stated that it was on account of the loss they had sustained on residuals during the half year. He (the speaker) should like to throw that to the winds at once as an excuse, inasmuch as it was a loss that every other gas company had to bear; and, so far as they knew, there was no other gas company in the kingdom who contemplated making an increase in the charge for gas as the result of that loss. Compared with the corresponding period of 1896, the loss on residuals was only £7293, against which they had had to take no less a sum than £74,519 from their reserve fund; so that the loss on residuals was the lamest possible excuse for raising the price of gas. The reason given by Mr. George Livesey was far more likely to be the true one—that it was on account of bad management and over-capitalization. It might be within the knowledge of those present that Mr. Field was the presiding genius of the Company. He was appointed to the position he now held about five years ago—having previously been the Company's Accountant. However much he might be responsible or otherwise, the fact remained that in the last five years things had gradually gone from bad to worse with regard to the affairs of the Company. In 1890, the consumers had little to complain of so far as the price of gas was concerned. In the June quarter of that year, they were paying 2s. 6d. per 1000 cubic feet, against 2s. 4d. charged by the South Metropolitan Company. Then there was the great strike of gas stokers; and, as the result, the southern Company put up the price 3d., while The Gaslight and Coke Company put theirs up 7d. After the struggle had ceased, the former very properly took off the 3d.; but the latter stuck to the 3s. 1d. for some time. He saw no reason why the 7d. should have been retained then; and he saw no reason now why they should not go back again to the 2s. 6d. In support of his statement as to the management of the past few years, he quoted at some length from the remarks of Mr. Livesey at the recent meeting of the Company (*ante*, p. 287). Speaking of the sliding-scale, he said he should like to show how unfairly this worked. The increase in the price would mean a reduction of ½ per cent. in the dividend. The shareholders would therefore lose £26,000 per annum; while the increase of 2d. in the price of gas would take no less than £160,000 from the consumers. So that this increase of 2d. would soon enable the Company to guarantee their 12¾ per cent. for several years. The wages paid to the workmen had nothing whatever to do with the question; for the South Metropolitan Company paid their employees quite as well as The Gaslight and Coke Company did theirs, and, in addition, gave them a bonus. Representing as the delegates did some 3 millions of inhabitants, they should show the Directors an undivided front in repelling their exorbitant charges; and he thought they ought to make themselves a force before which the Company would have to give way.

Mr. Lane (St. Martin-in-the-Fields) suggested that the resolution should be amended by the addition of the words "past and" before "present management."

The amendment was accepted by the mover and seconder.

Mr. Valentine (Poplar), in order to show "what effect public bodies sometimes had on gas companies," referred to the agitation regarding the price of gas at Hanley some few years ago. To the action taken by the Corporation he ascribed the reduction which had been made from 3s. 6d. to 2s. 3d. per 1000 cubic feet. He thought it was time that something was done with the "monopolies" existing in London. At the East-end, they felt this more perhaps than the inhabitants of Clerkenwell. The water monopoly pressed them very heavily; and, as to the gas, they had instances of consumers on one side of a road paying The Gaslight and Coke Company 2s. 10d. or 3s., while on the other side the Commercial Company only charged 2s. 6d. There must be something wrong when such a state of things existed.

Mr. Johnson (Clerkenwell) ventured to think that it was quite time the sliding-scale, which was introduced in 1876, should be revised. Through its operation, the Company had been able to pay a dividend of 12¾ per cent. The circumstances of 1876 were altogether different from those of 1898. For instance, electric lighting had since arisen, and had now come into the market in a cheap form. He considered the Company had had the best of the bargain during all these years; and the Board of Trade should now be asked whether the sliding-scale had worked well. He contended it had not; and therefore a new sliding-scale ought to be imposed. It was in the power of every Vestry to compete with the Company by applying for a Provisional Order to supply the electric light; and this was what they were proposing to do in Clerkenwell.

Mr. Irons considered that all they need do at present was to show the hardship which rested on the consumers in The Gaslight and Coke Company's district, and leave the Board of Trade to make the necessary inquiry, and expose "the inherent weakness of this extortionate Company."

The resolution, as amended, was unanimously carried.

Mr. Eve (Stoke Newington) moved the second resolution: "That as the conversion and consolidation of the Company's stocks under the Bill now before Parliament would enhance the Stock Exchange value of the Company's undertaking by a very large sum, the conference is of opinion that Parliament should refuse to pass the Bill unless the Company make some substantial concession to the consumers in the form of a reduction in the price of gas."

Mr. Johnson moved the insertion, after the word "stocks," of "and the making of such new stocks into trustees' stocks." He pointed out that the proposed conversion would advance the value of the Company's stocks to an enormous extent. It was proposed to turn the existing capital of 11¾ millions into no less than 26 millions, or, by a stroke of the pen, increase its value by 120 per cent. He called attention to the effect of conversion upon the Stock Exchange value of the South Metropolitan Company's stocks; and taking the South Metropolitan precedent as applying to this case, he calculated that the holders of the stock would receive a present varying between 2 and 4 millions of money. Here was the consumers' opportunity for getting a *quid pro quo*. As the Company were asking Parliament for this power, the consumers could very well ask for something in return.

Mr. Vaudry (Shoreditch), who seconded the motion, said that the consumers had some claim on both the Gas and Water Companies in respect of the frequent opening of the roads by them. They might be told that the Companies paid for this; but no amount of pay could recompense the ratepayers for the great inconvenience to which they were constantly being put.

Some discussion took place at this point on a proposal that the words after "unless the Company" should be substituted by "reduce its charge to that which obtains on the other side of the river;" but it was ultimately decided to retain the original resolution, with the addition of the words proposed by Mr. Johnson. In this form, it was passed.

Subsequently, it was agreed that the London County Council should be asked to make every effort to oppose the Company's Bill unless a concession in the price was made. It was the opinion of the delegates that public meetings of gas consumers should be called in each of the parishes affected to support the Local Authorities in the action they are taking, and also that it was desirable the consumers should request their representatives in Parliament and on the County Council to use their utmost effort to assist the object for which the conference was called. It was further decided to send the resolutions to all the Vestries and District Boards north of the Thames, and to all the Metropolitan Members of Parliament, with a request that they should give them their support.

It was intimated that the Chairman would forward a letter to the Board of Trade embodying the first resolution.

A vote of thanks to the Clerkenwell Vestry for having taken the initiative in this matter was unanimously passed.

COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report of the Directors of this Company for the half year ending Dec. 31, 1897, which, with the accounts for this period, will be presented at the meeting of the proprietors on Thursday:—

The Directors submit the accounts for the half year ended Dec. 31, 1897. The revenue account shows a net profit for the half year of £47,910 14s. 4d.; making with £296 18s. 10d. received for interest, £48,207 13s. 2d. This, added to the amount brought forward from the previous half year, makes £49,789 13s. 5d. Deducting therefrom £4501 1s. 5d. for interest on debenture stock, there remains standing to the credit of the net revenue account a balance of £45,288 12s. available for dividend. The Directors recommend that dividends be declared at the rates of 13½ per cent. per annum upon the old stock of the Company, and of 10½ per cent. per annum upon the new stock, both less income-tax. The amount by which the profits of the Company are insufficient to pay the dividends will be taken out of the reserve fund.

The accounts accompanying the report consist of the usual statements. They show that stock to the amount of £750,750 has been raised out of the total of £830,000 authorized; and that £200,750 has been borrowed out of £300,000 sanctioned. The receipts on capital account are £951,500 (£8708 raised in the half year), the whole of which, and £9804 more, has been expended; making the total capital outlay £961,304. The expenditure on capital account in the past six months comprised £25,202 for new and additional buildings, plant, &c.; £1965 for new mains and services; £796 for meters; £1903 for stoves; and £4773 for "coin" meters and fittings, less £1329 written off for depreciation. The reserve fund amounted to £44,267, and the insurance fund to £28,652 on Dec. 31 last. The balance-sheet shows that the value of the stores on hand at the close of the past year was as follows: Coals and oil, £20,207; coke and breeze, £4118; tar, ammoniacal liquor, and sulphate of ammonia, £7537; sundries, £13,990—total, £45,852. The revenue and profit and loss accounts, together with the statements relating to the working, are given below. The total quantity of gas accounted for includes 19,995,000 cubic feet used on the works, &c.; 2,000,000 cubic feet being employed as fuel for power. The accounts are signed by Sir R. Giffen, the Official Auditor.

REVENUE ACCOUNT.

To Manufacture of gas—				By Sale of gas—			
Coals and oil, including dues, carriage, unloading, and trimming	£73,069 7 9			Common gas, per meter, at 2s. 6d. per 1000 cubic feet	£138,584 14 7		
Salaries of Engineer and Officers at works	2,276 0 0			Public lighting and under contracts, common gas	9,807 11 1		
Wages (carbonizing)	20,825 2 6					£148,392	5 8
Purification, including £2313 1s. 11d. for labour	4,620 10 5			Rental—			
Repair and maintenance of works and plant, materials and labour (less £283 15s. 5d. received for old materials)	16,623 9 0			Meters	£3,282 1 6		
		£116,914	9 8	Stoves	1,202 18 2		
Distribution of gas—				Coin meters and fittings	2,045 7 7		
Salaries and wages of Officers (including Rental Clerks)	£1,616 6 4					5,530	2 3
Repair, maintenance, and renewal of mains and service-pipes, including labour	2,063 9 4			Residual products—			
Repair and renewal of meters	1,778 18 5			Coke, less £4704 16s. 11d. for labour	£21,597 17 9		
" " stoves	1,549 4 2			Breeze, less £828 6s. 1d. for do.	166 12 1		
" coin meters and fittings	836 6 8			Tar	6,443 13 8		
		7,894	4 11	Ammoniacal liquor and sulphate of ammonia	6,326 6 8		
Public lamps—Lighting and repairing		2,806	12 3			34,534	9 9
Rents, rates, and taxes		7,287	17 11	Miscellaneous receipts—			
Management—				Rents receivable	£322 10 10		
Directors' allowance	£1,250 0 0			Transfer fees	28 10 0		
Company's Auditors	75 0 0					351	0 10
Salaries of Secretary, Accountant, and Clerks	1,135 10 9						
Collectors' salaries and commission	1,478 19 7						
Coin meter collection	208 15 8						
Stationery and printing	686 5 7						
General charges	455 11 10						
		5,290	3 5				
Bad debts		457	1 8				
Law charges		47	10 4				
Superannuation		126	0 0				
Official Officers		73	4 0				
	£140,897	4 2					
Balance carried to net revenue account	47,910	14 4					
	£188,807	18 6			£188,807	18	6

PROFIT AND LOSS (NET REVENUE ACCOUNT).

Interest on debenture stock	£4,701 1 5		Balance, June 30, 1897	£48,263 5 3		
Balance available for dividend, carried to balance sheet	45,238 12 0		Less—Amount of dividend paid for half year ending June 30, 1897, £45,787 10s., and £293 15s., available for dividend, carried to reserve	46,681 5 0		
				£1,582 0 3		
			Balance revenue account	47,910 14 4		
			Dividends and interest balance	296 18 10		
	£49,789 13 5			£49,789 13	5	

STATEMENT OF GAS MADE, SOLD ETC.

Quantity Made. Meter Register.	Quantity Sold.		Total Quantity accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
1,285,422	62,019	1,108,911	1,190,925	5,624

STATEMENT OF COALS.

Description of Coal.	In Store, June 30, 1897.	Received during the Half Year.	Carbonized during the Half Year.	Used and Sold during the Half Year.	In Store, Dec. 31, 1897.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	23,730	111,553	119,148	353	15,782
Cannel	9,338	—	512*	—	8,826
	33,068	111,553	119,660	353	24,608

* 298,753 gallons of petroleum spirit used as a substitute for cannel.

STATEMENT OF RESIDUAL PRODUCTS.

	In Store, June 30, 1897.	Made during the Half Year.	Used during the Half Year.	Sold during the Half Year.	In Store, Dec. 31, 1897.
Coke—tons	9,892	72,680	18,628	56,467	7,417
Breeze—chaldrons	3,320	10,063	—	10,983	2,400
Tar—gallons	281,040	1,195,403	—	1,112,953	366,490
Ammon. liq.—butts of 108 gals.	12,508	39,676	38,253	—	13,931
Sulphate of ammonia—tons	414½	1,163	—	1,355	222½

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Thursday—Mr. E. FOTTRELL, J.P., in the chair.

The SECRETARY and MANAGER (Mr. W. F. Cotton, J.P.) having read the notice convening the meeting, the report of the Directors, the principal features of which were given in the "JOURNAL" last week, was taken as read.

The CHAIRMAN, in moving the adoption of the report, said the shareholders would see by the accounts accompanying it that the total receipts for the half year ending Dec. 31, 1897, compared with the corresponding period of 1896, were less by £797, notwithstanding that there had been carbonized 1774 tons more coal, and the gas manufactured therefrom sent out. The explanation of this state of things was to be found in the extraordinary depreciation in the prices received for residual products. The loss under this head amounted to £3128. How long this condition of things might last, it was impossible to say. They must, however, hope for a reaction in prices. On the other hand, it was very gratifying to be able to report that the consumption of gas was steadily increasing; and that whatever apparent loss might have taken place by the use of electric light was more than made up by the extended use of gas for cooking and heating purposes and for gas-engines. Large establishments were beginning to discover that to produce electric light at a very low cost they must have their own installations; and hence it was that within the last twelve months a number of large gas-engines had been erected in the city for supplying motive power for the production of this light. To these branches of the business the Board were giving special attention. It was as well the public should be made aware that the Company, in order to encourage the use of gas-engines for all purposes where motive power was required, allowed a rebate of 25 per cent. on the cost price of engines of 4-horse power and upwards; and, in addition, an allowance of 10 per cent. was made on the gas used in all gas-engines. They were satisfied that, by adopting such means as these, no diminution would take place in the consumption of gas. They understood that a new incandescent burner was about to be introduced by the Welsbach Company; and if the accounts heard of it were correct, it would be the means of producing from ordinary coal gas the best and cheapest light known. The present incandescent burners gave a light of about 17 candles per cubic foot of gas consumed. The new burner, it was stated, would give nearly double this amount, and would have the advantage of furnishing a proportionate amount of light for every cubic foot of gas consumed, commencing with a consumption of half a cubic foot per hour. The mantles would be much more permanent than those at present in use; and the burner could be used without a chimney. The economy in mantles must therefore be considerable, as large numbers were injured owing to the breaking of the chimneys. An examination of the accounts showed that for some years past the Company had been struggling along with a very insufficient amount of working capital. The Directors thought a company of the magnitude of theirs should be in a better position; and, as a consequence, they intended to take advantage of the powers conferred upon them at the general meeting held on Sept. 29, 1883, and raise a small amount of capital, which would be issued in the form of debenture stock. He concluded by saying he was satisfied the Company were working right well, and was perfectly confident they would continue in their present, or even in a better, condition.

Mr. JOHN R. WIGHAM seconded the motion; and it was carried unanimously.

The dividends recommended were then declared; and the retiring Directors and Auditor were re-elected.

Mr. CREE proposed, and Mr. SCALLAN seconded, a cordial vote of thanks to the Directors, the Manager, the working staff, and the other officers of the Company. The former said he knew from personal experience that these gentlemen attended with the utmost assiduity to their labours; and he had much pleasure in proposing the vote of thanks to them.

The proposition was unanimously agreed to.

The CHAIRMAN and Mr. COTTON acknowledged the compliment; and the proceedings closed.

YORK CORPORATION AND THE GAS COMPANY'S BILL.

An Amicable Settlement of Disputed Points.

An arrangement has been effected between the Gas Committee of the York Corporation and the Gas Company by which the petition presented by the former against the Bill of the latter is to be withdrawn. A report setting forth the concessions made by the Company was prepared for presentation at yesterday's meeting of the Council. It states that the share capital raised by the Company is £180,000; and the money borrowed on mortgage bonds is £20,000. Of the share capital, £100,000 is entitled to a maximum dividend of 10 per cent.; and the remaining £80,000 to 5 per cent.—the total maximum dividend therefore being £14,000. The Bill proposes to convert the share capital into £350,000, carrying a uniform maximum dividend of 4 per cent.—that is a total of £14,000 dividend. The Company also propose by the Bill to take power to issue an additional £90,000 share capital with a maximum dividend of 4 per cent., and to raise on mortgages, &c., a further sum of £30,000. The Committee were of opinion that the amount of the increased capital was excessive; and it has now been arranged that the additional share capital is to be restricted to £80,000, and the further borrowing powers to £20,000. In connection with the additional capital, the Company are also to insert the "auction clauses" in the Bill. All mortgages, debenture stock, and other securities given by the Company after the passing of the Bill into law are to be made repayable within the period of twenty years from the date of borrowing. At present, if the profits made by the Company are not sufficient to pay the maximum dividend, the Company have power to fall back on the reserve fund to make up the deficiency. This power is now to be limited so that they shall not apply any part of the reserve fund in making up the deficiency of any dividends which shall have fallen short of the maximum rates for more than six years previously. The existing minimum illuminating power of 14 candles is to be increased to 15½ candles. The Company have the power under their existing Acts to charge 3s. 6d. per 1000 cubic feet within two miles from the centre of Ouse Bridge, and 4s. beyond that distance. A clause is to be inserted in the Bill providing that the price to be charged for gas to consumers by meter shall not exceed 3s. 6d. within an area comprised within the radius of two miles of the centre of Ouse Bridge and such places in the city as for the time being extend beyond that radius, and 4s. beyond that area. The law provides that the Company may accumulate a reserve fund to the extent of one-tenth of its share capital—that is, the maximum reserve fund should be £18,000. The Company have accordingly accumulated £18,000 in the reserve fund; and, in addition, according to the statement of accounts for 1897, there is a further "balance of net profits" of £33,696. It is, however, subject to a reduction of £7000 for the second half-year's dividend in 1897; making a net extra balance of £26,696. It appears that the Company have had occasion to overspend their capital account by nearly £1200; and in order that the consumers may get some benefit out of the extra balance of profit, the Company are to pay off £12,000 of the existing mortgage debt.

THE HULL CORPORATION AND THE KINGSTON-UPON-HULL GAS-WORKS.

The Transfer Completed—A Generous Act on the Part of the Directors.

The formal transfer of the undertaking of the Kingston-upon-Hull Gas Company to the Hull Corporation took place last Thursday, at the offices of the former. To complete the necessary legal formalities occupied upwards of an hour; and, at the conclusion, the whole of the staff employed by the Company assembled in the Board-room for the leave-taking. Among those present were Mr. J. P. Smith and Mr. E. Lambert, Chairman and Vice-Chairman of the Company; Alderman Massey and Alderman Rayment, Chairman and Vice-Chairman of the Corporation Gas Committee. Mr. Smith, addressing the men, said they were doubtless aware that from that day the City Corporation would take possession of the works. In view of this, and as a recognition of the services which the men had rendered to the Company in the past, a sum of money had been voted by the Board, to be divided among the men in proportion to their length of service. The sums to be given to each had been invested in their respective names in the Hull Savings Bank; and the deposit-books were now ready. He hoped this would be the means of inducing the men to put by more money for a rainy day. He also trusted that the harmonious relations which had existed between the Company and their employees in the past would be continued with the Corporation, who now became their masters. Mr. Lambert, in a few remarks, said the Directors had ever felt that the prosperity of the Company was owing to a considerable extent to the workmen; and they considered it only right, when the Corporation took over the works, that a sum of money should be voted to the men in recognition of the loyal and faithful services they had rendered. Alderman Massey stated that every effort would be made to get the men employment with the other Gas Company when the time came (which might be considerably over a year) for the works to be dismantled. The men passed a resolution thanking the Board for their kindness in apportioning a sum of money for division among them. The deposit-books were then distributed.

The Proposed Extension of the Teignmouth Gas-Works.—Difficulties have arisen in the matter of the proposed extension of the Teignmouth Gas-Works. At the meeting of the District Council last week, Colonel Morrison complained that the same "bilious" gas was still being sent out, and no progress was being made with the purchase of the land for the extension of the works. From the reply of the Chairman (Mr. F. Slocombe) it appears that the delay is due, in part at least, to the Local Government Board. There is also difficulty in regard to the acquisition of the property required for the enlargement of the works. Until these troubles are overcome, building cannot be commenced; but, in the meantime, it is intended to lay the new main, the want of which is said to be the cause of the low pressure and consequent complaints of the poor quality of the gas.

KIRKBY LONSDALE GAS-WORKS PURCHASE ARBITRATION.

Council Offices, Kirkby Lonsdale.—Friday, Feb. 25.

(*Before Mr.* W. O. Roper, *Umpire.*)

It may be remembered that some months ago a movement was initiated for the acquisition of the undertaking of the Kirkby Lonsdale Gas Company by the District Council. It was arranged that the price should be settled by arbitration; and Mr. Thomas Newbigging, M.Inst.C.E., was appointed by the Company, and Mr. A. Silverthorne by the Council. These gentlemen being unable to agree, the services of Mr. H. O. Roper, of Lancaster, were sought to act as Umpire; and the matter came before him to-day.

Mr. W. Tilly appeared for the Company; Mr. R. R. Blennerhasset, Q.C., represented the Council.

Mr. Tilly, in opening the case, said the Company was established under Deed of Settlement in the year 1850. The capital was £1000, in £5 shares; and the Company had power to raise another £1000. The capital had been increased from £2000 to £5000, of which £2800 had been subscribed. There was a peculiarity about the works; one part being erected on freehold land belonging to the Company, the other part on land owned by the Council. They would have to value the leasehold land. The Company on starting purchased the land, on which they erected a dwelling-house, engine-house, retort-house, &c. They afterwards—in 1867—took the waste land adjoining for 10s. a year; and the next year they paid 15s. Then the Local Board was established; and in 1870 there was a lease of the upper land to the Company at the rent of £3 per annum. It continued in their occupation until 1883, when the lease expired. It was very significant that nothing was said about leaving any fixtures at the expiration of the term. In 1873, another lease was granted for additional land; and in this there was an absence of all claim that the tenant should give up buildings and fixtures. When the lease expired in 1883, the Council raised the rent to £15 a year; and this had been paid ever since. According to the lease, all the buildings were the tenant's fixtures, and would be removable. In 1870, Casterton was supplied with gas. A pipe went across the Lune to that place; the outlay on the work being £330. This constituted another peculiarity in the case, as it had been decided by the Local Government Board that the Council could not purchase anything out of their district; and it was agreed that nothing should be paid for the Casterton plant, and that these profits should not be considered. He put in a draft of suggestions as to the bases on which the arbitration should be conducted, and concluded by contending that by the original agreement the Council undertook to purchase not only the freehold property but the Company's interest in the leasehold land and all the buildings erected thereon.

The following witnesses were then called:—

Mr. *J. R. Picard*, the Chairman of the Company, said he had attended the meetings of the Council when the proposal was made for the sale of the gas-works, and also the conferences at which the terms were arranged. He had paid £8 7s. 6d. for double shares in the Company—£7 nominally. He, with the Secretary, had gone closely into the financial position of the concern, and had drawn up a statement showing the gas made, the profits, and the leakage, &c., to the 30th of June, 1897. He said most decidedly that the works were more valuable at the present time than they had ever been.

In cross-examination by Mr. Blennerhasset, witness said the profits for the half year ending June, 1897, were £197, including £27 brought forward. In the profits for previous years they included Casterton; but, by agreement, this was struck off. With regard to the land, they were in an awkward position, because if the Council evicted them they would have difficulty in carrying on their business; but if the land were taken away, it would be in the spirit of confiscation.

Mr. *J. Greenbank* said he had been Secretary of the Company since May, 1871. Before that date the main to Casterton had been completed. The amount of capital subscribed was £2000, and a further sum of £800 had been added out of the reserve. The total length of mains was 4298 yards, exclusive of Casterton. The number of service-pipes was 170; and of meters belonging to the Company, 169. A good many improvements had been made out of revenue. The reserve fund was formed out of revenue, when the money might have been handed over to the shareholders as dividend. As a whole, he considered the pipes good. They had not pushed the sale of gas, which might be very much increased. He could not tell off-hand what had been expended in improvements. No dividend was paid one year, on account of the coal strike.

Mr. *T. Newbigging* said he was acquainted with the Kirkby Lonsdale Gas-Works, one portion of which was on freehold, and another on rented land. He explained the nature and construction of the works, which he said were in very substantial order. Any little defects there were could easily be remedied. With regard to the plant, the best way to judge main-pipes was to find out what was the extent of the unaccounted-for gas. It worked out at 9·4 per cent.; but no account had been taken of the consumption of gas upon the works, which was usually reckoned at 1·5 per cent. From this, and from the fact that the amount set down for repairs was heavy, he concluded that the distributing plant was in good order. The apparatus and plant were in excess of present requirements. He estimated that the retorts could produce 28,000 cubic feet of gas per day; and the maximum daily make was 17,000 cubic feet. This left 11,000 feet, or 64·7 per cent. as excess. The condenser was 58 per cent. in excess of present requirements; the exhauster was to a very great extent in advance of existing needs; and the purifiers were 50 per cent. in excess. The gasholders were just sufficient. Thus, when the Council came into possession, the plant would enable them to increase the supply of gas. They would have to put up an extra holder. He estimated the structural value of the works at £3460, made up as follows: Buildings, machinery, apparatus, and plant, £2266; distributing plant, £1119; freehold land, £75. In this he included Casterton. The Casterton extension was £336. The share capital was £2800. This was not the whole of the capital, because there had been expenditure on extensions from the reserve fund—something like £400. There had been a gradual increase in the sale of gas from 1880 to the present time. In that year it was 2,039,550 cubic feet; and for the year ending December last it was 2,850,100 cubic feet. With regard to the dividend, nothing was paid in the first two

years; in the third year it was 3 per cent.; in the fourth year, nothing; and since then it had varied from 3 to 6 per cent. The original price of gas was 9s. per 1000 cubic feet, and it had been reduced to 5s. 2d., which he thought was a reasonable sum, considering the cost of carriage of material. He thought if the works were transferred to the Council there would be a material increase in the consumption of gas. Only one-half the population were supplied; and the Company had never attempted to push the sale of gas by the introduction of cooking and heating stoves, automatic prepayment meters, &c. He estimated that the profits could certainly be increased one-third. For the purposes of valuation, he had taken the average of the years 1894-96; the accounts for 1897 not being completed when he made out his figures. The usual custom was to take the last year's working. The actual profit in 1894 was £172 18s. 5d.; in 1895, £186 9s. 10d.; and in 1896, £138 10s. 7d.—making an average of £165 19s. 7d. The expenditure upon the repairs and renewal of works had been 8·86d. per 1000 cubic feet, which he calculated was 2·86d. in excess. This produced £33 4s. 9d.; making the maintainable profits £199 4s. 4d. He took 25 years' purchase of these, though the usual figure was 26⅔ years. This was equal to 3¾ per cent. Twenty-five years' purchase produced £4980. From this he deducted the proportion of profits due to Casterton—£24 8s.—which he multiplied by £25; producing £610. This reduced the figure to £4370. For excess works he added £330; but deferring that for ten years reduced it to £223. Adding £437 for sale under the Arbitration Act—namely, 10 per cent.—the total was £5030. Any balance of revenue and the reserve fund would be retained by the Company; and the Council would take over the stock-in-trade at a valuation at the date of the transfer.

In cross-examination, witness said the present plant would require additional storage, as there was not quite enough for a day in the present holders; therefore none of the excess plant could be made available without expenditure on a new holder. In making out the structural value, he had assumed that everything on both the freehold and leasehold land belonged to the Company. The plant on the rented land was not all attached to the freehold; £400 worth could be taken away. He valued the chattels on the rented land at £1184; but if the whole of those things were held to be attached to the freehold, they would have to be deducted from his valuation. The increase in the gas manufactured was 2·19 per cent., and in the gas sold 2·13 per cent. This was a slow rate; the average throughout the country being 4 per cent. In regard to the valuation, if he had included the year 1893 his average profits would have been materially reduced; but had he taken 1897, and added it to the three years he had given, it would have been greatly increased. He considered 6d. per 1000 cubic feet was a proper sum to spend upon renewals, &c. He was aware that this was not a statutory Company; but Cowes, which was also non-statutory, got 27 years' purchase. He considered the difference between a statutory and a non-statutory company was two years.

Mr. *H. Lawton* stated that he was Manager of the Carnforth Gas and Water Works. In his opinion, the output of gas would increase at Kirkby Lonsdale when the Council had possession of the works. If they let out cookers and stoves, as they had done at Carnforth, they were sure to extend the consumption. Prepayment gas-meters might also be introduced. The works were quite capable of supplying more gas. He thought the 25 years' purchase basis was a fair one. He was sure this was a good undertaking.

Cross-examined: He considered the management at Kirkby Lonsdale was not up to date. The Company had not taken measures to increase their business; and the works had been badly managed.

This was the case for the Company.

Mr. Blennerhasset then addressed the Umpire on behalf of the District Council. He said they were all agreed as to the right principle on which the valuation should be made; they must look to the profits. The view put forward by Mr. Newbigging was an extravagant one. Having got the maintainable profits and the number of years' purchase, they had to deduct the amount necessary to enable those profits to be earned—that was to say, the sum required to put the works in proper condition. His evidence would go to show that a large amount would have to be spent on the works. Having considered these points, the Umpire would have to approach the peculiar feature of the case, which was the fact that the greater part of the land on which the works had been erected did not belong to the Company. There could be no question that the leasehold land was the property of the Council, and must be deducted from the valuation. If he was right in his view of the law, the buildings on that land also belonged to the Council. Even if some of them were held to be fixtures which the Company were entitled to remove, the great bulk of them were undoubtedly the property of the Council. He submitted, therefore, (1) that they must consider the maintainable profits multiplied by a certain number of years, (2) the deduction of the amount required to enable those profits to be earned, and (3) the deduction necessary in consequence of the works on the leasehold land being the property of the Council.

Mr. *Silverthorne* then gave evidence. He said the capital of the Company consisted of £2000 in 1870, and there was a sum of £760 which was practically money diverted from revenue. The outlay on works was represented as £1925; but some additions were made, to the extent of £984 4s. 8d. The share capital was really represented by £2960; and as the expenditure had been £2909, there was a balance of £50 15s. 4d. The profits had varied between £333 4s. 11d. in 1883, and £32 9s. in 1893. The dividends had been as high as 7½ per cent. in 1893, 1876, and 1881; but in 1893 nothing was paid and nothing was carried to the reserve fund. It would be wrong to assume that any of the amounts stated as profits were actually profits. In 1896, when it was stated that the profit was £167, there was a sum of £26 17s. 3½d., carried over from the previous year. The interest on the reserve fund was also included; and he did not consider this an element of profit so far as the purchase was concerned. They could only deal with that which was properly earned. As to the reserve fund, there was a sum of £567 19s. in 1889; but in 1892 it was £454. In December, 1892, there was an outlay, and it dropped to £292, of which £250 was invested. In 1893, the large holder was resheeted; and this should have been charged to the renewal account. The annual rate of increase in the gas made from 1890 to 1896 was 2·19 per cent., which meant that it would take 35 years to double itself. On the sale of gas the annual rate of increase was 2·36 per cent., which would require 31 years to double itself. This was the slowest rate of increase with which he had been associated. The general increase over the country was 5 per cent. In his opinion, particular attention should be paid to the actual supply of gas the Company could convey to the purchasers. The profits they made in the past were only applicable as a measure of those to be earned in the future. His attention had been directed to the fact that one consumer (Mr. Harris) who in 1895 burnt 244,000 cubic feet of gas, had discontinued his supply; and Casterton was excluded. These were two important facts; and they meant a loss of 21·6 per cent. Though there was this loss of revenue, the cost of production would be the same. He could not see any excess plant. His valuation of the works, on a commercial basis, was as follows: Including Casterton, the average profits for the five years ending 1895 were £120, to which he added the rent of the leasehold land £15. The lowest rate at which this could be capitalized was 16⅔ years, and the highest 20 years. Upon these rates the value worked out as follows: Profits, at 16⅔ years, £2250; deduct necessary renewals, £640; net value of undertaking £1610, less land £150, total £1460. At 20 years' purchase, the capitalization of profits produced £2700, less £640 renewals and £150 land; making £1910. Excluding Casterton, the average profits were £82; and £15 rent brought this up to £97, which at 16⅔ years' purchase produced £1616 13s. 4d. Deducting £640 for renewals and £150 for land, made £826. At 20 years' purchase, there was a sum of £1940 for profits capitalized, less £640 and £150; making £1150. Excluding both Casterton and Lunefield, the profits were £62, and there was £15 for rent of land; making £77. This capitalized at 16⅔ years' purchase produced £1283 6s. 8d.; and with the deductions for renewals and land the value of the undertaking was £493 6s. 8d. At 20 years' purchase on the same figures, the value of the undertaking was £750.

Mr. Tilly: Do you suggest to the Umpire that a concern yielding £170 a year should be bought for £750?

Witness: Yes; that represents the value at 20 years' purchase.

In further cross-examination, witness admitted that on his figures in connection with the Ambleside arbitration the price paid was at the rate of 34½ years' purchase. The profits on the Kirkby Lonsdale concern in 1897 were more than in the years he had taken, notwithstanding that Mr. Harris's supply had gone.

Mr. *T. N. Ritson*, Assoc.M.Inst.C.E., the Engineer and Manager of the Kendal Gas and Water Works, said he estimated that an expenditure of £550 would be required to put the Kirkby Lonsdale works into proper condition for maintaining the present income.

Mr. Blennerhasset, in summing up the case for the Council, said it was a fortunate thing the parties were agreed upon the principle of valuation; and it was for the Umpire to determine the right sum to take as the maintainable income. It was clear that he could not adopt any figures that included profit derivable from Casterton; and the fact had to be considered that when they reduced their output by no longer supplying that place, they did not decrease the working expenses in proportion, because many of them were fixed charges. As regards the maintainable income, he contended that the Umpire was bound to take the average, excluding Lunefield and Casterton; giving the Company, if he liked, credit for any small increase in 1897. But, on the other hand, no definite and permanent increase in Kirkby Lonsdale had been proved. He argued in favour of Mr. Silverthorne's suggestion that the number of years' purchase should be between 16⅔ and 20, as there was an essential difference between statutory and non-statutory companies, and this was one of the latter class. The next thing to be done was to see that there was an undertaking that the profits should be maintained; and therefore they were entitled to have deducted the sum necessary to put the works into a proper state of repair. With reference to the claim for excess of plant, he asked the Umpire to dismiss this, on the ground that there was no prospect of it being required, and that it could not be put into operation. The only other point in which that case differed from any other was the extraordinary position of the Company in regard to the occupation of the land. If the Council had chosen, they could have made it impossible for the Company to exist at all; but he acknowledged that this would have been arbitrary. With regard to the things on the land, however, he claimed them for the Council. He maintained that they belonged to the freehold, and could not be removed without injuring it. Having satisfied himself what were not trade fixtures, the Umpire should take the gross value, and deduct it from the sum previously obtained. The Council did not wish to be hard; and when the Umpire had allocated these things, they wished him to take a liberal view of the claims of the Company.

Mr. Tilly said he wondered why the Council sought to be possessors of the Company's property, seeing how they depreciated it. Mr. Silverthorne valued the works at £750—works which had produced an average profit during the last three years of £166. He put it to the Umpire, as a man of business, whether he could rely upon such a calculation. The shares had sold for £9 5s. each; and the income showed a progressive Company, though the progress was small. Mr. Harris seemed to be the bogey in the case; but he (Mr. Tilly) would point out that, notwithstanding Mr. Harris's secession, the output was greater, as were also the profits. Furthermore, there was room for considerable development. He argued that 25 years' purchase was the proper basis to take, and not that suggested by Mr. Silverthorne. If they were to take Mr. Silverthorne's figures, they would have to do the same as was done in the Ambleside case—multiply them by 34½ years' purchase. He concluded by upholding the right to the property on the leasehold land which consisted of trade fixtures.

The inquiry then closed; the Umpire reserving his award. This has since been made; the amount being £2891, with the value of coal, coke, tar, ammoniacal liquor, and stock-in-trade in addition.

Prohibiting the Use of Carbide of Calcium and Acetylene.—On the recommendation of the Town Hall Committee, the Hanley Town Council have decided to prohibit the use of carbide of calcium, compressed acetylene, or other gases in the Victoria Hall.

The Mid-Sussex Water-Works Transfer.—Under the terms of the Umpire's award, the Cuckfield District Council have entered into possession of the undertaking of the Mid-Sussex Water Company; the formal handing over of the Balcombe works having taken place on Monday last week.

THE SUPPLY OF CARBURETTED WATER GAS IN LIVERPOOL.

The Corporation Health Committee and the Gas Company.

At last Thursday's Meeting of the Health Committee of the Liverpool Corporation, the question of the supply of carburetted water gas in the city was again brought forward in connection with correspondence between the Corporation and the Gas Company. As directed by the Committee at their last meeting, the Town Clerk wrote to the Company calling their attention to the report of the Medical Officer of Health upon the recent fatal case of gas poisoning in Great George Square, and asking to what extent and in what localities the Company were now supplying carburetted water gas; also whether, as suggested by Dr. Hope, the Company would take steps to warn consumers in all cases where carburetted water gas or mixed coal and water gas was supplied. To this a reply from the Secretary of the Company was now read. It was to the effect that the letter of the Town Clerk had been laid before the Directors, who suggested that, pending the result of the inquiry by the Departmental Committee of the Home Office, it was expedient and courteous to defer consideration of matters relating to the supply of carburetted water gas. In the course of the conversation which followed the reading of the reply, the Chairman (Alderman Cookson) said, under the circumstances, he thought it would be but courteous to accept the Company's suggestion, in the hope that they would bear the letter of the Corporation in mind. If within a reasonable time they showed no inclination to do anything, the Committee might take further proceedings. Mr. Shelmerdine considered that the inquiry had nothing to do with what the Committee asked. They merely wanted to know in what parts of the city water gas was being supplied. Mr. Roberts inquired whether it would not be better if the Company ceased to supply carburetted water gas until the inquiry had been held. Dr. Bligh described the letter of the Company as ambiguous. They either supplied this "deleterious" gas, or they did not. He suggested that the supply should be stopped at once. The Company should not be allowed to go on in this way after the expression of opinion which the Medical Officer of Health had given with regard to the effects of the gas upon the health of the public. It was a very important matter; and many deaths might be caused by this gas before the end of the inquiry. Mr. Pierce (the Assistant Town Clerk) stated that several of the Corporation officials had been summoned to give evidence at the inquiry; and he had no doubt that information would be elicited which would guide the Company in the matter. Mr. Roberts said he had been told that, when a leak occurred in the pipes through which the carburetted water gas was conveyed, it was a difficult thing to discover it; and the people in the house might be breathing the injurious gas. The house where the recent fatality occurred was No. 4, Great George Square; and he (Mr. Roberts), who lived at No. 12, did not want to be poisoned. Mr. Shelmerdine proposed, and Dr. Bligh seconded, that the Company be asked to give a definite reply to the letter of March 18. The Chairman pointed out that they could not compel the Company to give the information. Mr. Shelmerdine thought it should be on record that the Committee wrote them two letters, and that they had refused the information. Mr. Pierce remarked that they had not refused. Notice had been given to consumers that water gas was being supplied. Mr. Roberts and Dr. Bligh stated that they had not received a notice; and the latter added that he believed they had contracted for coal gas. The Chairman made a remark implying that "gas" only was specified, to which Dr. Bligh retorted that no other than coal gas was understood at the time. The Chairman suggested that the subject should be adjourned for a fortnight. The Committee voted a sum of money the previous week for the purpose of having an analysis of the gas; and if they had the result of that analysis before them, they could confront the Company with it. He did not like to push the Company too much. No doubt they would, after a warning from the Committee and the death of the man in Great George Square, be very careful in future. Mr. Shelmerdine's motion was carried by a majority of one.

THE EXETER GASHOLDER CONTRACT.

The question of the Exeter gasholder contract, to which reference was made in the last number of the "JOURNAL," gave rise to a good deal of discussion in that city during the past week. It came before the Council of the Chamber of Commerce on the 28th ult., when a communication was received from Messrs. Willey and Co., inviting the Chamber, in the interests of Exeter and its working men, to endeavour to ascertain why the order had been placed with firms out of the city. It meant, they said, a loss of wages to the city of more than £3000. Their business with the Gas Company had, they added, for ten years been practically *nil;* and yet the Company derived their revenues, under parliamentary monopolies, from the public of Exeter. The Chairman (Mr. Mallet) and other members of the Council expressed the opinion that it was a matter for regret that, at a time when efforts were being made to advance the trading interests of Exeter, the Directors of the Company had sent their work elsewhere, and at a higher figure than Messrs. Willey and Co. would have executed it for. The following resolution was passed: "That the Council of the Exeter Chamber of Commerce have heard with much regret that the Directors of the Exeter Gas Company have given the contract for large works about to be carried out by them to an outside firm, although a lower offer was received from an Exeter firm, and that, consequently, the expenditure of a large sum of money for labour is lost to the city. The Council feel that an explanation is due to the public in the matter." This resolution was forwarded to the Directors of the Company, who met on Tuesday, when, it is stated, the subject was fully discussed. A local paper says that the contract for the new tank has been given to Messrs. Westwood and Wright, of Birmingham, and that for the new holder to Messrs. E. Cockey and Sons, Limited; the tenders amounting together to £9454. The tender of Messrs. Willey and Co. was for £9000; but it is stated to have been accompanied by stipulations which led the Directors who considered the tenders to reject it. The account of the meeting of the Directors in the same paper adds that none of them are now shareholders in Messrs. E. Cockey and Sons, and that the Manager had given instructions to sell out the shares which he held in that Company. It is further said, in denial of the allegation that Messrs. Willey have done little or no business with the Gas Company for ten years, that during the past twelve months the Company have paid them upwards of £500. The Directors decided to send, in reply to the resolution of the Chamber of Commerce, a statement of the reasons for the non-acceptance of Messrs. Willey and Co.'s offer.

After the meeting of the Directors, a letter was sent to Messrs. Willey and Co., explaining that they were precluded from accepting a tender o the firm "because it contained conditions of an objectionable nature, altogether different from those on which the other firms tendered; and, in fairness to the latter, it could not be treated on the same basis as they were." Mr. H. A. Willey has, in reply, published the letter which accompanied the tender of his firm. This says that if the makers of the plates decline to undertake delivery of the material in order to enable the holder to be erected in the short time specified, "we should ask the exercise of your Engineer's discretionary powers to reasonably extend the time." They also suggest that tests of the material should be made at the steel-works, and not locally in accordance with the conditions of the makers. The letter continued: "No reason exists for any difference of opinion between your Engineer and ourselves in carrying out so plain and straightforward an obligation; yet, in the event of such a contingency, we ask the usual arbitration clause—the sole arbitrament of an interested officer being, we submit, *ultra vires*." Mr. Willey contends that there is nothing in this which is objectionable; and he says that if there were, the Directors did not suggest any modification of the conditions, notwithstanding that acceptance of their tender would have saved the Company £445, and at the same time retained the work in Exeter. Mr. Willey also repeats the statement that the business of the Gas Company with his firm has been practically *nil*. The main exception last year was an order for patented articles for which Messrs. Willey and Co. are sole agents for the district, and which were supplied on agency terms to the value of £427. Mr. Willey concludes with the remark that he has no wish to prolong the controversy, or to say a hard word against the Company. The probability is that the matter will now be allowed to drop.

COLONIAL GAS UNDERTAKINGS.

In the "JOURNAL" for the 22nd ult., we gave a few particulars as to the working of several colonial gas undertakings. Reports relating to three others have since come to hand, and we therefore notice their salient features.

At the annual meeting of the Auckland (N.Z.) Gas Company on the 7th of February, the Directors reported an increase to the extent of 13 per cent. in the quantity of gas sold in 1897 as compared with the previous year. The revenue from this source amounted to £48,832; that derived from the sale of residuals, to £7808—the total receipts being £57,944. The expenditure on the manufacture of gas was £26,635; on its distribution, £3920; and on management, £3534—the total being £36,467. There was consequently a balance of £21,477 to go to the profit and loss account. A dividend of 7s. 6d. per share for the half year was recommended in respect of all fully-paid shares, and an equal proportion on those which are partly paid. After providing for these payments there would be left a balance of £3239. In moving the adoption of the report, the Chairman (Mr. J. H. Upton) explained the accounts accompanying it, which are now presented in an amplified form, more like that adopted in England. He then proceeded to refer to the principal events of the past year. Satisfactory arrangements had, he said, been made with the City Council for introducing incandescent gas lighting for the public thoroughfares. This had cost the Company about £500; and as the amount came out of revenue, the profits were less to this extent. The great improvement effected, however, was, he was sure, satisfactory alike to the city and the shareholders. He next dealt with the project for erecting works on Freeman's Bay, in accordance with the advice given by the Company's Engineer (Mr. Chenery Suggate, Assoc.M.Inst.C.E.); and he said that if the increase in the demand for gas continued in the future as it had done in the past three or four years, the question of moving to that place would have to be considered. The present extension of the Company's business, together with the work at Freeman's Bay, would not only necessitate an expenditure of capital to the extent of £10,000 previously asked for, beyond £15,000 raised last year, but would need another £5000—the latter being required for new mains. He congratulated the shareholders on the satisfactory balance-sheet presented, and, in conclusion, referred to the valuable services rendered by the permanent officers; special mention being made of the Secretary (Mr. E. B. Parsons). The report was adopted.

In the six months ending Dec. 31 last, the sale of gas by the Brisbane Gas Company produced £19,418; and at the recent annual general meeting the Directors reported a net amount of £8339 to the credit of the profit and loss account, inclusive of the balance brought forward. They recommended a dividend of 4½ per cent., the payment of which, with the dividend tax (£315), would absorb £6610—leaving £2229 to be carried forward. They pointed out that the widely increasing use of the incandescent burner, on account of the improved light furnished, and the greatly diminished cost to the consumer, is, in effect, equivalent to a reduction in price.

The Directors of the Rockhampton (Queensland) Gas Company presented their fiftieth half-yearly report, embracing the six months ending Dec. 31 last, at the ordinary general meeting on the 17th of February. They stated that the business had slightly improved, and that there were many indications of development which would have an advantageous effect upon the future operations of the Company. The Municipal Authorities have recently taken steps to have erected by the Company some powerful gas-lamps. During the half year the free gas-fittings scheme was extended, with good results to the Company, and great convenience to many residents who had formerly used oil as an illuminant. The incandescent gas-burners which, through their general adoption in the town, have caused such a marked reduction in the revenue of the past few years—a reduction equal in some instances to about 50 per cent.—have

brought the consumption as low as it is ever likely to be; and the turn may now be considered to have been made. In view of the steady increase which has become apparent during the past few months, the Directors expressed the hope that the large consumption which was general in former years will be equalled at an early date. The Company's Order-in-Council under the Electric Light and Power Act of 1896 is still under consideration. An electric arc lighting contract has just been entered into with the Harbour Board, which will mean increased revenue to the Company's electrical department. The gas operations show a profit of £1825 for the half year; the electrical operations, a return of £156, which has gone towards the payment of the interest upon the debentures, leaving a debit balance of £143. The net profit on the whole of the Company's business is £1682; and from this the Directors recommended the payment of a dividend of 7 per cent. per annum upon the ordinary shares, and 9 per cent. per annum upon the preference shares, amounting to £1681, free of dividend-tax. They also recommended that the unpaid dividend upon the preference shares for the half year ended June 30, 1897, amounting to £115 13s., should be paid out of the £1000 placed to the credit of the reserve fund for the equalization of dividends for that period.

ELECTRIC LIGHTING NOTES.

Electric lighting is making better progress under the manangement of the Exeter Corporation than it did under the Company who built the works. One reason is, no doubt, that the Corporation are not hampered for capital as the Company were; while they are themselves good customers of the Electric Light Department. Since the Corporation took over the works, considerable extensions have been made; and at the last meeting of the City Council, it was decided to apply for sanction to borrow an additional £7000 to cover the cost of new machinery, extension of the cables, &c. The lighting of the streets by electricity is for the present delayed. Some difficulty has arisen respecting the arc lamps, and a new set are to be manufactured. This will take till well into April; so that it will be May or possibly June before the new experiment of lighting the streets is made.

Torquay is already discovering that, like other towns which have indulged in the luxury, it must pay pretty heavily for the electric lighting of its streets. The rate estimate presented to the Town Council last week shows that public lighting cost £962 17s. 2d. for the half year ended Sept. 30 last. For the corresponding period of the present year, with some of the streets lit by electricity, the estimated expenditure is £1183—an increase of 23 per cent. This extra outlay is interesting, because while it has taken place the Surveyor complains that the amount spent on the roads has been cut down to practically nothing at all. Local criticism on the new method of public lighting is that it is capable of improvement. In several parts of the town, the lamps are too far apart—the result being deep shadows in the intervening spaces; and it is prophesied that, sooner or later, additional lamps will have to be provided. At present the installations in villa residences are very few; and a smaller number of tradesmen than was expected have taken the light, for the reason, it is supposed, that they want to be assured of its success before incurring the expense of fittings.

Mr. E. P. Burd, one of the Inspectors of the Local Government Board, sat last Thursday at the Leeds Town Hall for the purpose of hearing an application by the Corporation for a Provisional Order, empowering them to create irredeemable stock bearing a dividend not exceeding 5 per cent. for the purchase of the undertaking of the Yorkshire House-to-House Electricity Company. The Corporation were represented by the Town Clerk; and Mr. Cyril Dodd, Q.C., appeared for the Company. The Town Clerk, after observing that the Corporation were asking for permission to issue a special kind of stock to enable them to carry out their part of a contract which existed between them and the Company, read the subsection of the Company's Order which rendered the inquiry necessary. He added that the Company were constituted about 1890. The total expenditure on capital account to the end of December was £161,000; and they had laid 21 miles of mains, while notice had been given of their intention to put down a further 12½ miles. The capital expenditure, less deduction for depreciation, was £154,409. This would mean, according to the present value of 5 per cent. security, £308,818 to be paid to the Company, or double their capital expenditure. The profit for the past year, after transferring £2300 to the depreciation fund, was £10,703. Interest at the rate of 5 per cent. on £154,409 represented £7720; leaving £2983 for sinking fund purposes. Assuming the market rate of interest to be 2½ per cent., the amount required to be provided for at the end of 60 years would be £308,818, in order to produce 5 per cent. per annum on the capital value, or purchase-money, and the amount to be set aside annually to produce £308,818 at the end of 60 years would be £2271. Mr. Dodd, while not opposing the application, suggested that the inquiry should be adjourned to see if the members of the Council would consent to make an agreement that the shareholders of the Company be bought out by ordinary redeemable stock upon the terms arranged in a similar transaction at Sheffield. The shareholders were favourable to the adoption of this course. The Town Clerk was unable to agree to Mr. Dodd's suggestion; and the inquiry terminated.

We have on various occasions referred to electric lighting affairs at Taunton. The undertaking, it may be remembered, was started by a Company about twelve years ago; and after spending upwards of £20,000, about half of which was lost, it was disposed of to the Corporation in 1893. They have already expended £25,000 upon it, and have decided to borrow a further sum of £10,000 for the general purposes of the installation. This fact has given rise to some controversy in the borough; and one of the ratepayers has prepared a slip furnishing at a glance some interesting particulars for the benefit of his fellow-burgesses. The following figures show how the amounts expended by the Corporation have gradually increased: 1893 (three months), £11,041; 1894, £14,877; 1895, £18,108; 1896, £23,200; 1897, £25,058. The sums received from private consumers in the above-named years were £451, £1432, £1375, £1489, and £1683; the cost of public lighting being £204, £845, £1052, £1396, and £1515. The working expenditure and the interest and sinking fund payments make the following totals: £978, £3008, £3025, £3245, and £3479. Comparing the years 1894 and 1897, it will be seen that while more than £10,000 additional capital was expended, the increase in the amount received from private consumers was only about £250; while reference to the years 1896 and 1897 will reveal the fact that the cost of the public lighting increased about £120, though in reality only two additional arc lamps were put up. The position of affairs at the end of last year was that a sum of £5331 was due to the Treasurer and £1775 had been taken from the rates; the result would be a deficit of £400 on the year, if the interest on the overdraft and other sums legally chargeable had been included in the accounts. Moreover, the plant is wearing out. The public lighting, which came to about £750 a year when it was done by gas—and badly done, it must be acknowledged, owing to the parsimony displayed in regard to the quantity used—cost, for the last completed year of the Corporation's accounts £2069 15s. 7d., or nearly £1320 a year more; while a sum approaching £10,000 in the aggregate has been spent on this service since the electric light was first introduced into the town. To sum up the position, the original company lost about £10,000; the Corporation have spent £25,000; there has been taken from the rates £1775; and there has been spent in increased public lighting about £10,000—making a total of £46,775. This outlay has been incurred to establish and carry on an undertaking which in nearly twelve years gets only £1683 a year in the way of private customers' business—a sum which it is probable would barely cover working expenses unless supplemented by the lavish expenditure of the ratepayers' money on the public lighting. The ratepayer who has put most of the foregoing figures in circulation asks if his fellows will, in the face of them, permit another loan of £10,000 to be obtained. He thinks they should not.

METROPOLITAN WATER SUPPLY COMMISSION.

Seventeenth Day—Monday, March 28.

(*Viscount* Llandaff, *Chairman*, *Sir* John E. Dorington, Bart., M.P., *Sir* G. B. Bruce, M.Inst.C.E., *Major-General* A. de Courcy Scott, R.E., *Rt. Hon.* J. W. Mellor, Q.C., M.P., *Mr.* A. de Bock Porter, C.B., *Mr.* H. W. Cripps, Q.C., *and Mr.* R. Lewis.)

The sitting took place at the Westminster Town Hall.

The following Counsel are engaged: Mr. Pope, Q.C., and Mr. Claude Baggallay, Q.C., for the New River Company; Mr. Littler, Q.C., and Mr. Lewis Coward for the Kent Water Company; Mr. Pember, Q.C., for the Lambeth, East London, Grand Junction, and West Middlesex Water Companies; Mr. Rickards for the Chelsea Water Company; Lord R. Cecil for the Hertfordshire County Council; Sir Joseph Leese, Q.C., M.P., for the Kent County Council and Kent Local Authorities; Mr. Balfour Browne, Q.C., and Mr. Freeman, Q.C., for the London County Council; Sir R. Nicholson for the Middlesex County Council; and Mr. Gabriel P. Goldney (Remembrancer) for the Corporation of the City of London. The Southwark and Vauxhall Water Company are represented by Messrs. Bircham and Co.

Mr. *C. A. Whitmore*, M.P., re-called, stated, in reply to Mr. Mellor, that if a Statutory Committee were established, upon which the ratepayers or people concerned in the nature of consumers should always have a majority (other interests, however, being also represented), and if there were control in the sense of an amalgamation of the Water Companies—if such a scheme were adopted by a Unionist Government, he thought the Unionist party on the County Council would support it.

Mr. Mellor: Suppose you have an amalgamation of the existing Water Companies, then one rate for the whole of London, and then this statutory body which is to have control over the existing Water Companies, with such a representation as I have suggested?

Witness: I confess I cannot see the width of that proposal. I do not think the County Council as a body would approve it. It seems to me that that sort of suggestion would not satisfy any of the advocates of purchase, while it would perhaps be unfair to the Water Companies. In my judgment, if the Water Companies are amalgamated, it will be quite unnecessary to have any new power; the existing powers of the County Council and of the Local Government Board would amply suffice to prevent the amalgamated Companies doing anything injurious to the public interest. I dislike, too, putting new bodies to control private enterprise, unless it was absolutely necessary; and in London more particularly I object to the multiplication of local authorities. I do not believe further control would be necessary, if the Companies were amalgamated.

Mr. Mellor: Then your suggestion is that the Companies should be amalgamated; and that is as far as your suggestion goes?—I should like to see the effect of that before I go further in the way of purchase or statutory control.

By the Chairman: There was much more to be said for a statutory body which purchased and then managed the Water Companies than for a statutory authority which should simply control the Companies. He was not satisfied as to the financial advantages, in the public interest, of purchase by any authority.

Mr. Cripps: Whether it is profitable or not must depend on what award the arbitrator gives. You must suppose that justice will be done to both sides?

Witness: I am assuming that Parliament would not sanction any terms of purchase that were not just to the Companies; and on that assumption I have never been able to assure myself that purchase would be profitable to London. By profitable, I mean that the purchasing authority should either reduce the water-rates or effect a saving in the general rates.

By Major-General Scott: If the idea of local representation were entirely discarded, and an authority appointed and controlled by Parliament, the plan would be very much disliked by the Progressives, but it would not be so unpleasant to the Moderates.

Mr. De Bock Porter: Is your main objection to purchase your doubt about its being financially profitable?

Witness: Yes; then I want to know what the body is that is going to be the ultimate managing controlling authority. I object to the establishment of another body in London; and the County Council, owing to its being so political a body, was most unlikely to be a good authority.

By Mr. Lewis: As to whether there would be any final settlement of this question unless the control of the Water Companies were handed over to the County Council or some central body, as in the Provinces, he said

London was in itself so different in its size from provincial towns that it was not wise, even theoretically, to model the institutions of London on those of Manchester and Birmingham. The conditions were totally different.

Witness then referred at some length to the political nature of the County Council, which was one of his reasons for objecting to the Water Companies being placed under their control. His doubts as to the ability of the County Council were restricted to the cases where labour or political hopes were involved. In the ordinary discharge of the very large duties entrusted to them, and where political questions did not enter, the Council did their work excellently. He attached the greatest importance to the amalgamation of the Water Companies; and he suggested this as a partial solution of the present problem. He wished to see the Companies amalgamated either into three or into one; and this might be accomplished either voluntarily or as the result of strong recommendation. He would allow some years to elapse to note the effect; and then, if there were still popular discontent, and if as years went by the Council grew less political and less partizan, he should have no objection to the Companies being purchased and subsequently managed by a reformed and improved London County Council. He did not see how the establishment of any other constitutional authority would be satisfactory, or how it could do much without being unjust to the Companies. Assuming control to be necessary, he saw no objection to (say) three officers being attached to one of the Government Departments to look after the Companies in the consumers' interests. The principal practical grievance in the present system was the inequality of the charges.

Sir J. Dorington: If there was an amalgamation, there would have to be an equalization of rates?

Witness: Yes.

If there was amalgamation, would there be any objection to the Council (say) appointing a director or two, as in the case of the Indian railways?—I see no great objection to that.

Would control be better exercised in that way than under the Act passed last session, which gives the Council the power of taking up anybody's grievance?—I think that was a very useful Act. I thought that met one of the particular supposed evils of the present system, by helping the aggrieved individual consumer in obtaining redress.

The Chairman: Nobody has yet suggested that it would be any remedy for the high charges?

Witness: No.

Mr. De Bock Porter: There is no remedy for that apart from purchase?

Witness: Quite so.

Mr. Lewis: Do you see any financial difficulties in the way of amalgamating?

Witness: I do not pretend to know enough about the details for that. There must be great practical difficulties; the more prosperous Companies must have less inducement to amalgamate than the poorer ones.

By Mr. Balfour Browne: From a legislative point of view, it did not seem to him impossible, nor that there would be any particular injustice, in saying the Companies must secure new sources of supply—say, that they should go to Wales. Constructing the aqueducts and bringing the water to London were quite another matter. It might be right that London should secure its sources of supply immediately; but he could not see that it was necessary at present to incur the expenditure of bringing that water to London. The consumers would have to pay for the new supply; but he did not know the interest at which the Companies would raise the money for the purpose. Control, he thought, would be oppressive or practically superfluous. Witness was then cross-examined at considerable length, with reference to his statement that the Council was too political.

Mr. Balfour Browne: Supposing we can make out to this Commission that, notwithstanding all possible threats, the administration is ineffective, the rates too high, and equalization impossible without purchase, would you be in favour of purchase to-day?

Witness: I should vote against it, even if the Government supported the second reading of the County Council Bill. With regard to making the Companies go to Wales for more water, I would not incur any expenditure beyond that necessary to secure the actual sources of supply.

Do you think Parliament would allow either the Companies or the County Council to buy a large piece of Wales, merely in contemplation of some future necessity?—I should have thought so. The interest on the cost would have to come out of the rates paid by the people of London, or else from the dividends of the Companies; but the latter would get the ultimate advantage. If the Council undertook the work, they could raise the money much more cheaply than the Companies.

By Mr. Pember: If Parliament refused power to the Companies to take more water from the Thames basin, they would, for their own sakes, go to Wales; and he saw no reason why they should not combine to do so (as in the case of the three Companies in connection with the Staines scheme), either voluntarily or under the pressure of some Government Department. As to there being no return for this expenditure, he thought it a plausible suggestion that the supply would only be necessary if a large increase of population occurred, in which case the income of the Companies would be proportionately raised. He should say a large number of Progressives were actuated by the idea of securing vast undertakings and managing them on Trade Union or Socialist principles. As to the reforms needed in the Companies, he mentioned as one the approximation of the management of the less popular Companies to the methods of the best managed ones. If there were amalgamation, there would be a survival of the fittest among the administrators of the Companies, which would be very desirable.

Mr. *G. P. Goldney*, the City Remembrancer, was the next witness. In reply to the Chairman, he gave a summary of the operations of the City Corporation with reference to the water question. For a great many years the Corporation had devoted much attention to the water question, not from a merely selfish or insular standpoint, but as being the only public body within the Metropolis until recently that could oppose Water Bills on public as distinguished from local grounds. The Corporation introduced the Metropolis Water Bill (Meter) in 1884, under which consumers could, if they liked, pay for water by meter—a matter of considerable interest to the City, where rateable values were high. As far as London was concerned, that received the strongest support, and was opposed by the Water Companies on the ground that it was unfair. The meters were to be supplied by the Companies at the request of the consumers, the latter paying rent for them; and the Companies said this obligation would entail the raising of additional capital.

Mr. Baggallay said it was estimated that it would require £3,000,000 of capital to supply London with meters, and another £1,500,000 for fittings and connections.

Witness (continuing) said the next step was the public inquiry in 1890; the object being to ascertain whether purchase was practicable or desirable. The view of the Corporation was very much influenced by a visit which they paid to Glasgow and Manchester, at both of which places they found that, although the purchase had taken place at what looked like an enormous figure, the authorities had recouped themselves by the increase in the rateable value of the City, and had, in fact, apparently suffered no loss, though in both cases they had to incur the additional expense of bringing supplies from a great distance. The conclusion was in favour of purchase; and a Bill with this object was introduced in 1891, which incorporated the London Water Commission, consisting of the Lord Mayor, the Chairman of the London County Council, and 49 other members, including representatives of the London County Council (20) and of a considerable number of other towns and counties. This Bill, with the Vestries' Bill, went before Sir M. W. Ridley's Committee. At the same time, negotiations passed between the Corporation and the County Council, the result of which was the drafting of what was known as the "Agreed Bill." Eventually a Bill was passed, under which the County Council were empowered to spend money on inquiries into the water question; the most important part of the Bill being lost. At the end of 1897, the County Purposes Committee of the Corporation prepared another report specially for the present Commission.

The Chairman: Have the Corporation come to any conclusion as to the financial consequences of purchase?

Witness: Yes; especially in the light of the evidence given since this Commission has been sitting.

What has been the result?—The result would appear to be that the City ratepayer would have to pay a considerably increased amount of money for the water supplied to him. Mr. Haward's figures showed that the earnings of the Companies under present management produce a profit of nearly 3 per cent. The present market price of the Companies was put by Mr. Haward at £39,615,349; and the dividends at £1,166,620, which gave 2·95 per cent. There is no reason to assume that if the County Council bought up the Companies at their present market values they would be able to reduce to any great extent the costs of management; while, on the other hand, the net income must be seriously lessened, as the charges of the dearer Companies would inevitably have to come down to the level of the cheaper ones, and provision would also have to be made for a sinking fund. Having regard to Mr. Haward's table, it may be taken broadly that the market value of £39,600,000 produces 3 per cent. to the investor—£1,200,000. To bring in this amount, say £48,000,000 of 2½ per cent. Metropolitan consolidated stock would be required.

Mr. De Bock Porter: But surely you do not propose to give Metropolitan stock for this. The proposal of the London County Council was to give cash?

Witness: I do not think that would affect the calculation very much. To recoup the seller, you must give him as much cash as will enable him to buy the stock.

The Chairman: You are assuming that you give him the £1,200,000 in perpetuity.

Witness: Yes.

Mr. De Bock Porter: This is practically giving a bonus of about £8,000,000?

Witness: The vendors must get something to produce their £1,200,000 per annum.

Mr. De Bock Porter: Not necessarily that amount. It would be the amount of the award.

Mr. Cripps (on behalf of the County Council) said it had always been held by the Council that market value, the figure with which Mr. Goldney was dealing, was not to be admitted as criterion of value.

Witness: I merely took it for the sake of argument. I must have some basis. These figures are based on the assumption that the holders of loan as well as share capital would be paid in cash. The £48,000,000 of Metropolitan stock having been raised and issued, the interest upon it (£1,200,000) and the cost of management, which might be put at 2s. 6d. per cent., or £50,000, as well as a sixty years' sinking fund—say, £300,000—would have to be earned, before any pecuniary profit, by reason of better management, could accrue to the ratepayers. These three figures of £1,200,000 interest on £48,000,000 2½ per cent. stock, £50,000 cost of management, and £300,000 sinking fund, totalled £1,550,000. This would seem to be the figure to compare with Mr. Haward's stated total dividends and interest, payable by the eight Companies in 1896—namely, £1,166,620. An economy, therefore, of £400,000 a year in management alone must be effected before the ratepayer would get any advantage. If that economy could not be effected this £400,000 must be met out of the rates, which in the County of London alone would be covered by a rate of 3d. in the pound; but, as outside areas might be expected to contribute their quota, possibly a rate of 2d. in the County of London might suffice.

The Chairman: You are proposing to give them £48,000,000 in cash, and you observe that the market value of their shares is something under £40,000,000

Witness: Yes.

How do you justify that?—It is share and loan capital.

Mr. De Bock Porter: You are making a present of £8,000,000.

The Chairman: That is assuming that you are buying them to pay the same income at 2½ per cent., as they are now realizing at 3 per cent.

Witness: Yes.

Surely that is full measure, pressed down, and running over?—They would argue that they are entitled to receive in perpetuity at least as much as they are receiving now, because they would say their business is increasing and valuable, and they have back dividends to make up.

You are assuming that the arbitrator has given 40 years' purchase. It is possible; but it is a little high?—Well, supposing you give them 30 years' purchase.

It will come out at £36,000,000 instead of £48,000,000.

Major-General Scott: I understand you to say that you bring in to this calculation such values as prospective increase of dividends, and so on?

Witness: I say that the Companies before an arbitrator would try to do

so. In the case of the other companies that have been bought up, the purchasing corporations have had to pay very much over the market value. This is what the Companies contended for in 1880.

The CHAIRMAN: In your account, you have added nothing for compulsory purchase or for costs of arbitration?

Witness: No; everything comes in that figure.

Is it the opinion of the Corporation that in the event of purchase the existing water charges will have to be kept as they are, and in addition a rate of some amount charged upon the ratepayers of London?—That is so.

If the water charges are reduced, of course the rate-in-aid must also be increased?—Yes. The City have gone into no independent calculation, but have taken Mr. Haward's, and reasoned upon it. After purchase it would be impossible to maintain the present inequalities of charges; the rate would have to be brought to one level, and that the lowest, presumably. If reduced to the lowest, the total loss would be, for both Inner and Outer London, about £250,000 yearly—about £161,000 for Inner London alone. In the Administrative County a 1d. rate produces about £141,000, so that a loss of £250,000 means nearly a 2d. rate. I should not expect, after purchase, that the exemptions which now prevail in different parts of London would continue.

Therefore the charges in the City would have to go up?—They would have to be levelled up to the level of the lowest. I have been unable to calculate how much more the City would have to pay, because the City Authorities have never been able to ascertain the exact amount paid by the City or the precise quantity of water supplied there.

Witness was still under examination when the Commission adjourned till the 18th inst.

Sales of Shares.—At Falmouth, on Monday last week, 50 £1 shares in the Falmouth Gas Company were sold by auction for £2 14s. each; while another lot of 25 similar shares realized £2 17s. 3d. per share. On Wednesday, Messrs. Herbert Morris and Son disposed of stock and shares in the Lewes Gas and Water Companies. Three lots of £100 original capital stock of the Gas Company were sold at £203, £204, and £205 respectively; while £90 of similar stock realized £182. Some original fully-paid £25 shares in the Water Company fetched prices ranging from £55 to £83 each. One £25 share in the same Company, on which £20 has been paid, fetched £58; two similar shares being sold for £59 and £60 respectively. £20 of preference stock realized £30. At Newport (Mon.) on the same day, Mr. Thomas Parry sold 60 £100 "C" shares in the local Gas Company, the statutory dividend on which is at the rate of 7 per cent. per annum. The first ten shares realized £166 each; and the remaining fifty, an additional £1 apiece. The total amount produced by the sale was £10,010; the premium therefore amounting to £4010. On Thursday, Messrs. Waterman and Sons sold £390 of consolidated stock of the Maidstone Gas Company at prices ranging from £131 to £132 10s. per £58 lot. £40 of stock realized £101. Some fully-paid £25 shares in the Farnham Gas Company were recently disposed of for £59 each.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Royal Scottish Society of Arts held a meeting at their hall in George Street, Edinburgh, on Monday night, at which the first business was the submission of the report of a Committee, presided over by Professor Ivison Macadam, upon the paper by Mr. D. Bruce Peebles, on "Acetylene Gas and Apparatus for its Production," which was read before the Society on the 24th of January last. The Committee recommended the paper and apparatus to the serious consideration of the Society's Prize Committee; and the report was adopted.

Then Mr. G. K. Grieve submitted a communication on "The Comparative Cost of Gas and Electricity as Sources of Light, Heat, and Power." The subject, as the President afterwards remarked, was too large—embracing several points each of which would have been sufficient for one evening. Mr. Grieve did not mince matters in his comparisons. The hall is usually lighted by electricity; but on this occasion he had it lighted by twelve Welsbach incandescent gas-burners. It was with these that his principal comparison lay. Speaking of them, he showed how an increase of pressure from 7-10ths to 25-10ths led to a decrease in the light of from 81 to 57 candles, a loss of 34 per cent. Mr. Grieve is an advocate of low-quality gas; and in this connection he spoke of Edinburgh gas as being 20 per cent. richer than that of Glasgow, but to its also being 38 per cent. dearer. Coming to compare the two lights, he adopted tables prepared by Mr. W. H. Preece, from which it appeared that to get the same amount of light from a 12-candle lamp at the end of 2000 hours it is necessary to supply it with two watts more than it required at the beginning. He calculated that 20 Board of Trade units give a light equal to 1000 cubic feet of Edinburgh gas. Allowing for discounts, he took the extremely low figure of 3½d. per unit as the cost in Edinburgh, which gives, for 20 units, 5s. 10d., or almost exactly double the cost of Edinburgh gas at 3s. per 1000 cubic feet. That was with ordinary burners. He calculated the cost of lighting the hall by Welsbach burners at 1s. 3d. per hour; and by electricity, at 5½d. per hour. On the subject of heating, he said he had come to the conclusion that heating by gas, as compared with heating by coal, cost, at present prices, 2½ times more. He found it impossible to estimate the cost, from actual results, of heating apartments by electricity. In America, it was found that heating cars by electricity was about five times the cost of heating by coal. He had himself experimented with heating water by gas, and he found that the cost which was given out of heating water by electricity was twelve times more. As to the relative costs for motive power, the expense for electricity in Edinburgh would be three times that for gas. Although it was evident that there were difficulties to be overcome, electric traction appeared to be coming. Mr. Grieve's paper was of the convincing order, everything being vouched for by figures, so far as procurable. The audience cannot be said to have been sympathetic; for the glamour of electricity is over all scientific bodies, and one or two of the worshippers at the electrical shrine did not hesitate to speak their mind. But with only one of these will I deal. Bailie Mackenzie, the

GAS AND WATER COMPANIES STOCK AND SHARE LIST.

Referred to on p. 762.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 14	10½	Alliance & Dublin 10 p. c.	24—25	..	4 4 0
100,000	10	,,	7½	Do. 7 p. c.	16½—17½	..	4 5 8
300,000	100	Jan. 3	5	Australian 5 p. c. Db.	105—107	..	4 13 6
200,000	5	Nov. 11	6½	Bombay, Ltd.	5⅝—6¼	..	5 4 0
40,000	5	,,	6½	Do. New, £4 paid	4¼—5¼	..	4 19 1
380,000	Stk.	Feb. 24	12	Brentford Consolidated	293—298	−2	4 0 6
240,000	,,	,,	9	Do. New	223—228	−5	3 18 11
50,000	,,	,,	5	Do. 5 p. c. Prf.	140—145	..	3 9 0
159,375	,,	Dec. 15	4	Do. 4 p. c. Db. Stk.	134—138	..	2 18 0
220,000	Stk.	Mar. 30	11½	Brighton & Hove Orig.	270—275*	+¾	4 3 8
218,820	,,	,,	8½	Do. A. Ord. Stk.	195—200*	−¼	4 5 0
933,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	127—132	..	3 15 9
420,000	20	Ma . 30	11½	British	55—56*	..	4 0 4
50,000	10	Mar. 11	11½	Bromley, Ord. 10 p. c.	25—27	..	4 5 2
75,000	10	,,	8½	Do. 7 p. c.	20—22	..	3 17 3
500,000	10	Oct. 14	6	Buenos Ayres (New) Ltd	9½—10	..	6 0 0
98,122	Stk.	Dec. 30	4	Do. 4 p. c. Db. Stk.	98—100	..	4 0 0
150,000	20	Mar. 11	8½	Cagliari, Ltd.	30—31	..	5 6 5
100,000	10	Sep. 30	8	Cape Town & Dis., Ltd.	17—18	..	4 8 11
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	59—61	..	4 18 5
550,000	Stk.	Oct. 14	13¾	Commercial Old Stock	340—345	..	3 18 3
200,750	,,	,,	10½	Do. New do.	255—260	..	4 0 9
200,750	,,	Dec. 15	4½	Do. 4½ p. c. Db. dc.	154—157	..	2 17 4
800,000	Stk.	Dec. 15	12	Continental Union, Ltd.	225—235	..	5 2 2
200,000	,,	,,	9	Do. 7 p. c. Prf.	207—212	−1	4 4 11
51,600	Stk	Feb. 24	14	Croydon A 10 p. c.	310—315	..	4 8 11
168,400	,,	,,	11	Do. B 7 p. c.	255—265	..	4 3 0
535,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p c.	128—133	..	3 18 11
60,000	,,	,,	5	Do. 5 p. c. Prf.	140—143	..	3 9 11
486,090	10	Jan. 27	11	European, Ltd.	24—25	..	4 8 0
354,060	10	,,	11	Do. £7 10s. paid	17—18	..	4 11 9
5,922,110	Stk.	Feb. 10	12½	Gaslight & Coke, A, Ord.	280—285	−8	4 9 6
100,000	,,	,,	4	Do. B, 4 p. c. max.	118—123	..	3 5 1
665,000	,,	,,	10	Do. C, D, E, 10 p c. Prf.	305—315	..	3 3 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	150—155	..	3 4 6
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	220—225	..	3 6 8
1,300,000	,,	,,	7	Do. H, 7 p.c. max.	195—200	..	3 10 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	305—315	..	3 3 6
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	184—189	+1	3 3 6
1,061,150	,,	Dec. 15	4	Do. 4 p. c. Db. Stk.	131—136	..	2 18 10
294,850	,,	,,	4½	Do. 4½ p. c. do.	151—155	..	2 18 1
958,000	,,	,,	6	Do. 6 p. c. do.	202—20	..	2 18 0
70,000	10	Oct. 28	8	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	Nov. 11	10	Imperial Continental	213—218	..	4 11 9
376,400	100	Feb. 1	4	Do. 4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Db. Stk.	103—106	..	3 6 0
560,000	100	Apl. 1	5	Met. of Mel- bourne 5 p. c. Db.	110—112*	+½	4 9 3
				,, 4½ p. c. Db.	107—109*	+½	4 2 7
250,000	100	,,	4½				

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	Dec. 15	6	Malta & Medn., Ltd.	5½—6	..	5 0 0
541,920	20	Nov. 11	5	Monte Video, Ltd.	15—16	−½	6 5 0
617,946	Stk.	Feb. 24	9¾	Newc'tle & Gatesh'd Con.	235—240	..	4 1 3
252,375	Stk.	Jan. 3	3½	Do. 3½ p. c. Db. Stk.	115—120	..	2 18 4
150,000	5	Nov. 26	8	Oriental, Ltd.	8—8½	..	4 14 2
135,000	5	,,	8	Do. New, £4 10s. pd.	7—7½	..	4 16 0
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—2	..	4 0 0
60,000	5	Mar. 11	7	Ottoman, Ltd.	4½—5	..	7 0 0
420,000	100	Nov. 2	6	People's Gas 1st M. Bd.	104—109	..	5 10 1
500,000	100	Dec. 1	6	of Chicago 2nd do.	103—108	..	5 11 1
848,070	10	—	—	River Plate Ord.	1½—9¾	..	—
250,000	Stk.	Jan. 27	4	Do. 4 p. c. Db. Stk.	99—101	..	3 19 3
250,000	10	Sep. 30	10	San Paulo, Ltd.	16—17	..	5 17 3
135,000	Stk.	Mar. 30	10	Sheffield A.	245—248*	..	4 0 8
209,053	,,	,,	10	Do. B.	245—248*	..	4 0 8
447,427	,,	,,	10	Do. C.	245—248*	..	4 0 8
5,531,250	Stk.	Feb. 24	5½	South Metrop., 4 p.c Ord	135—139	..	3 15 6
1,460,000	,,	Jan. 13	3	Do. 3 p. c. Db. Stk.	104—107	..	2 16 1
60,000	Stk.	Mar. 11	12	Tottenham and A.	285—295	..	4 1 4
60,000	,,	,,	9	Edmonton B.	205—215	..	4 3 9
182,380	10	Dec. 20	7	Tuscan, Ltd.	13½—14½	..	4 16 7
149,900	10	Jan. 3	5	Do. 5 p. c. Dbs. Red.	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	Dec. 30	10½	Chelsea, Ord.	330—330	−10½	3 3 8
150,000	,,	,,	5	Do. 5 p. c. Prf.	177—180	..	2 15 6
160,000	,,	,,	4½	Do. 4½ p.c. Pf. Stk., 1875	157—160	..	2 16 3
175,785	,,	Mar. 30	4½	Do. 4½ p. c. Db. Stk.	158—163*	+½	2 15 3
1,720,560	Stk.	Oct. 14	8†	East London, Ord.	227—232	+3	3 9 0
654,740	,,	Dec. 30	4½	Do. 4½ p. c. Db. Stk.	158—166	..	2 14 3
390,000	,,	,,	3	Do. 3 p. c. Db. Stk.	105—107	..	2 16 1
700,000	Stk.	Dec. 15	7½	G'd Junct'n, 10 p. c. max.	120—125	..	3 0 0
310,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	143—148*	−2	2 14 1
708,000	Stk.	Feb. 10	13	Kent	358—363	..	3 11 8
160,000	,,	,,	7	Do. New, 7 p. c. max.	218—218	..	3 4 3
1,043,800	100	Dec. 30	10	Lambeth, 10 p. c. max.	298—303	..	3 6 0
406,200	100	,,	7½	Do. 7½ p. c. max.	228—233	..	3 4 4
350,000	Stk.	Mar. 30	4	Do. 4 p. c. Db. Stk.	140—145*	−4	2 15 2
500,000	100	Feb. 10	13	New River, New Shares	443—448	−2	2 18 1
1,000,000	Stk.	Jan. 27	4	Do. 4 p. c. Db. Stk.	142—147	−3	2 14 5
902,300	Stk.	Dec. 15	6	Southw'k & V'xhall, Ord.	155—160	..	3 15 0
126,500	100	,,	6	Do. do. 7½ p. c. max.	152—157	..	3 16 5
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf.	174—179	..	2 15 10
1,019,585	,,	Oct. 14	4	Do. 4 p. c. A Db. Stk.	143—149	..	2 13 8
1,155,066	Stk.	Dec. 15	10	West Middlesex	305—310	−1	3 4 6
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	160—165	−1	2 14 7
200,000	,,	Mar. 11	3	Do. 3 p. c. Db. Stk.	105—107	..	2 16 1

* Ex div.

† Next dividend will be at this rate.

Convener of the Corporation Electric Lighting Committee, entered the meeting near the close of Mr. Grieve's paper, but too late to hear the observations upon lighting. He took exception to the remark about power. He said the price of current in Edinburgh for motive power was 2d., and not 3d. per unit, as Mr. Grieve had said; and he expected that he should be able to induce the Corporation to reduce it to 1½d. I observe that since Monday night he has been successful in getting his Committee to accept the reduction. He had not gone into the relative costs, he went on to say; but his opinion was that electricity was, at present prices, only double the cost of gas for motive purposes. After some of the other speakers had given their say, Bailie Mackenzie, having learnt how the author of the paper had treated the subject of lighting, got up and said that he had asserted in a journal that electric light in Edinburgh was now rather cheaper than gas, and that nobody answered or contradicted that statement. The statement was contained in a letter to the "JOURNAL," which was published on Feb. 8. I prepared a reply; but knowing how impossible it is to convince a man against his will, I did not send it. But I must let Bailie Mackenzie finish his statement. He had come to the conclusion, he said, that electric light at 4½d. per unit was just about the same price as gas at 3s. per 1000 cubic feet. He knew many people who had found their bill for electric lighting, not to exceed, but to be rather less than it was before for gas. It was generally admitted that electricity at 4d. was as cheap as, if not cheaper than, gas at 3s. per 1000 cubic feet. The Directors of the Scottish Metropolitan Life Assurance Company had adopted a minute to the effect that they found electricity to be cheaper than gas. A member got up and pointed out that, in their experience of the lighting of that hall, they found electricity cost double what gas did. Now, Bailie Mackenzie's certificate from the Insurance Company was good enough to throw out at a public meeting; but when it is looked into, it will be found to be scarcely worth framing and hanging in the window. The Insurance Company is one of the smallest in existence; and it is under the command of Brigadier-General Lord Kingsburgh, the Lord Justice-Clerk of Scotland, who is an electrical enthusiast. Lord Kingsburgh is a man of varied accomplishments. Besides being a lawyer, he is an inventor. He invented an electric lamp device which is intended to be used at sea, to indicate the course of vessels approaching one another. He also invented a wicker-work sort of rack, for the holding of plates or saucers when on picnic. I am not aware that either of them has come into use. Probably this electric light certificate will be found to be of as much utility. There are many things which might explain a decrease in the lighting bill, which will occur to everyone, and need not be given. But, as to Bailie Mackenzie's statement, I suppose he will admit Professor Kennedy's report that 8-candle lamps in Edinburgh consume 26 units per annum. That is equal to 52 units for a 16-candle lamp, which is about the light given by Edinburgh gas in a No. 4 burner. Fifty-two units at 4½d. per unit amounts to 19s. 6d. per lamp per annum. Since Monday night, I have looked at receipts granted by the Edinburgh and Leith Gas Commission relating to the gas consumed in a dwelling-house during the past two years. There are always three burners, and frequently four, in use in the house—an average of 3½. For the first of those years the cost of gas lighting was £2 3s. 10d., which is equal to 12s. 6d. per burner; and for the second year the charge was £3 4s. 10d., equal to 18s. 6d. per burner. But in the second year a gas-cooker had been introduced, and had been used constantly. The result is, not that gas at 3s. per 1000 cubic feet—which it was during the whole of this period—cost as much as electricity, but that the householder paid out 1s. per burner per annum less, and had in addition the use of the gas-cooker on every day during the eight months it was in use. Over and above all this, Bailie Mackenzie's statement is vitiated by his taking the duty of the electric lamp at its initial or manufacturers' duty, and not at the figure which practice shows it comes down to in a short space of time. No; whatever may be in time to come, Bailie Mackenzie is premature with his comparison. He has worked wonders in his development of electric lighting in Edinburgh; but he has not turned the tables upon the Gas Commission yet.

The Glasgow Corporation Gas and Electricity Departments held their annual dinner in the Trades House Restaurant on Thursday night. Mr. R. M. Mitchell, the Convener of the Gas Committee, presided, and welcomed the guests. Mr. A. Wilson, in proposing the toast of "The Corporation," said that the members of that body, by their integrity and enterprise, deserved every honour. Bailie Fife, in acknowledgment, expressed pleasure at meeting so many useful and able public servants. Glasgow was not dependent upon one single industry. Years ago, the staple trades of the town were cotton-spinning, weaving, printing, and turkey-red dyeing. Now they had iron and steel manufactures, shipbuilding, chemical, and other industries. With the growth of the population, there had been an increase in material progress; they had better house accommodation, better water, cheaper gas, and cleaner and better paved streets. Soon, also, their river would be so purified that it would again be a pleasure to sail upon it. Mr. R. Hamilton, the Manager of the Corporation Lighting Department, proposed "The Gas Department." He said that 28 years ago the Corporation acquired the undertakings of two Gas Companies. In the first year of their management of the gas supply, the output was 1000 millon cubic feet, and the revenue was £225,000; now they had an output of 4625 million cubic feet a year, and a revenue of £500,000. This result had been achieved by good administration and strict attention to duty, from the Manager downwards. The Department had two formidable rivals—electricity and cheap oil. Still, 180,000 householders used gas. He did not know any municipal undertaking which had been so successful. Councillor Willock, in acknowledgment, said that since he had been connected with the Gas Department he had found that the undertaking was well managed. Criticism was easy outside; but when a Councillor took part in the management of a department, he began to see that the Committee were able men, honestly desirous to do their duty. A very pleasant evening was spent. These social functions are usually opposed by those who, strangely, call themselves Socialists. Such opposition is petty. An annual social gathering is productive of much good. There is no other agency I know of which so fosters the spirit of mutual confidence between employer and employee as does an assemblage round a festive board. An illustration of this was given the other week by the Great North of Scotland Railway Company, the Directors and officials of which devoted five nights to the entertainment of

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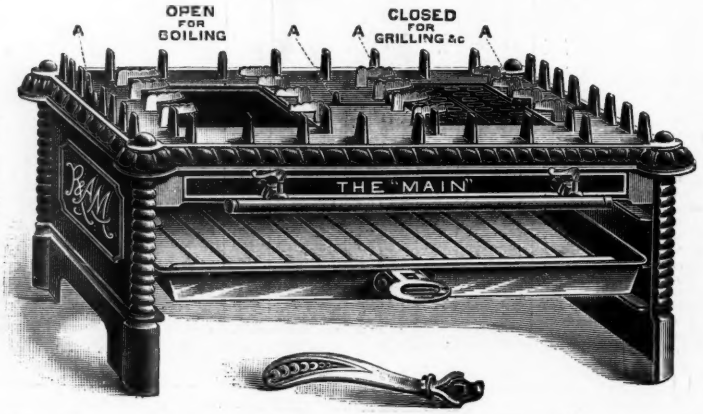

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their servants. Every employee, with his wife or other acquaintance, was granted a free journey into Aberdeen, where they were welcomed by a Director, were treated to substantial refreshments, music, cinematograph exhibitions, and dancing, and were sent home by special trains in time for the next day's work. The result is that a more contented and loyal body of servants does not exist in connection with any railway. It is an example worth following by those employing large bodies of workers.

The Dundee Water Commissioners have entered into a contract with an American firm for the supply of about 160 tons of pipes. The price is £5 8s. per ton. The offer of a Glasgow firm was £6 2s. 6d. per ton.

Mr. W. Currie was appointed Manager of the Leven Gaslight Company's works at Alexandria, some time ago. Being dissatisfied with the condition of the works, he has obtained the unanimous approval of his Directors for the introduction of Hislop's patent regenerative system of firing, by which a large saving will be effected. The system is found to be one of the easiest worked and most economical available; and it is being widely adopted. After having had experience of the system, the Directors of the Musselburgh Gaslight Company have resolved to extend it, by the erection of three additional ovens, in settings of sixes.

The annual inspection of the Greenock Corporation Water-Works was made yesterday. At the dinner which followed, Provost Erskine said that the income of the Water Trust increased from £7765 in 1867 to about £20,000 last year, and that notwithstanding that the domestic water-rate had been reduced from 1s. to 9d. per pound of rental, and for the last few years to the very low rate of 6d. per pound. As a Trust, they had been always on the best terms with the millowners. He had to report that the storage of water in the 23 reservoirs amounted to 173 days' supply for all purposes. Mr. Macdonald, of Messrs. John Poynter, Son, and Macdonalds, of Port Glasgow, responded. Provost Anderson Rodger, proposed "The Water Trust," to which Treasurer Anderson replied. Mr. Anderson said that the Trust offered every reasonable inducement to industries settling in the town; and they anticipated very marked success in the immediate future.

In the Sheriff Court of Kirkcudbright, at Maxwelltown, on Thursday, Messrs. Dinwiddie, hosiery manufacturers, were charged with a contravention of the Factory Acts, in respect of their having failed to fence a gas-engine and fly-wheel in their works. The Inspector of Factories described the engine as one of the most dangerous he had seen for some time. One of the Messrs. Dinwiddie said that the engine was protected on one side by a wall, and that it was impossible to fence the other side. He and his brother were both Justices of the Peace in Dumfriesshire; and they were as anxious to observe the law as anybody could be. The Sheriff said that the Act of Parliament was absolutely imperative; and he imposed a fine of £5, with 12s. 6d. expenses.

New Joint-Stock Companies.—The Berrow Water Company has been registered with a capital of £2000, in £1 shares, to supply the parish of Berrow, in Somerset, with water. The "Premier" Gas-Engine Company, Limited, has been formed with a capital of £100,000, in £10 shares, to adopt an agreement made between A. Rolleson and the Company for the acquisition of the business carried on by him.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 2.

Sulphate of Ammonia.—A considerable amount of business was done in the closing days of March, resulting in some improvement in values in Scotland; but the market is quiet at the close of the week at £8 16s. 3d. per ton f.o.b. Hull, and £8 17s. 6d. per ton f.o.b. Liverpool—the quotation f.o.b. Leith being nominally £9 per ton. Makers have met the demand freely; there being nowhere any disposition to accumulate stocks. Again the bulk of the buying has been for covering sales; consumers' further requirements not being urgent, and April delivery being offered abroad, speculatively, at under spot prices. There is a steady home demand; but heavy consumption has scarcely yet set in. Forward delivery is being offered at 2s. 6d. to 5s. per ton, according to position, below spot quotations, without attracting much interest. Makers generally are not offering ahead; but London makers have come out as sellers for April-June delivery at £8 12s. 6d. per ton, Beckton terms.

Nitrate of Soda is a shade firmer at 7s. 6d. per cwt. for fine quality on spot.

LONDON, *April* 2.

Tar Products.—Benzols and naphthas continue weak, and are still falling in value. The immediate cause undoubtedly is the large quantities of coke-oven benzol and crude naphtha being offered in this market, together with the increased production in Germany, which is so large now as to make buyers in that country practically independent of purchases in Great Britain. Fair business is being done in carbolic acid; and large deliveries of creosote are being made at improving prices. Anthracene is in somewhat stronger request; while there is undoubtedly a better feeling in regard to pitch. Although this season may not see any important increase in price, it is felt that the bottom has been reached, and that for forward delivery more money will be obtainable.

Average quotations are: Tar, 12s. to 15s. Pitch, east coast, 19s. 6d.; west coast, 16s. 6d. Benzols, 90's, 1s. 0½d.; 50's, 1s. 2½d. Toluol, 1s. 4½d. Solvent naphtha, 1s. 3½d. Heavy naphtha, 1s. Crude, 30 per cent., naphtha, 5d. Creosote, 2⅝d.; liquid, 3d. Heavy oils, 40s. to 45s. Carbolic acid, 60's, 2s. Naphthalene, 50s.; salts, 30s. Anthracene, "A," 5½d.; "B," 4½d.

Sulphate of Ammonia.—If anything, this market is a little steadier, although determined efforts are being made to depress the value. Buyers are only offering £8 10s. to £8 15s.; while sellers are holding for £8 17s. 6d. to £9, less 3½ per cent. in all positions.

Proposed Joint Water Board for Heywood and Middleton.—A special meeting of the Heywood Town Council was held last Wednesday, to consider a resolution declaring it to be expedient to apply to Parliament for the introduction into the Heywood Water Bill now in the House of Lords, of additional clauses providing for constituting a Joint Water Board, consisting of representatives of the boroughs of Heywood and Middleton, and vesting in the Board the present Heywood undertaking. The proposal was unanimously agreed to.

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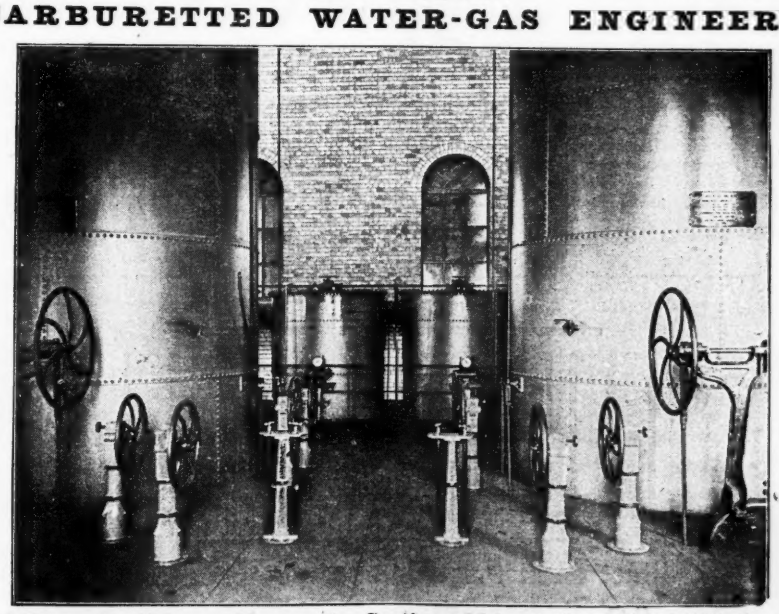

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COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The present month has opened with a steadier tone in prices than seemed probable. At one or two Lancashire collieries definite reductions in list rates for some classes of round coal were being talked of last week; but so far any downward move of this kind is apparently held in abeyance, while the more or less general reduction in round coal arriving from Yorkshire at this time of the year has not yet come into operation. The stronger tone in prices is no doubt in some measure due to the increased inquiry for house-fire purposes, which has enabled pits to keep on full time, and in most cases to get rid of their output without much difficulty. At the pit mouth, current prices remain at 10s. to 10s. 6d. per ton for best Wigan Arley; 8s. 6d. to 9s., for Pemberton four-feet and seconds Arley; and about 7s., for common house coal. No material change can be reported with regard to the other descriptions of fuel. The lower class round coals are still plentiful; the output being in excess of requirements, even with all the principal coal-using industries fully occupied. For inland sales, prices remain at about 6s. to 6s. 6d. per ton for ordinary steam coal. The only direction in which there is any approach to improvement is in the shipping trade, where some of the colliery owners who have been recently quoting excessively low figures are beginning to harden up slightly; 7s. 9d. to 8s. 3d. per ton now representing the minimum figures for steam coal at the ports on the Mersey, with 8s. 6d. obtained for some of the better qualities. Engine classes of fuel continue to move off fairly well, with some collieries short of slack; but supplies in the open market are plentiful, and increasing in quantity from other districts. The result is that, though prices are maintained at late rates, any upward move upon these would seem to be out of the question. About 3s. to 3s. 6d. per ton remain the average figures for common slack; 3s. 9d. to 4s. 3d. for medium; and about 4s. 6d. to 4s. 9d., for the best qualities.

Northern Coal Trade.—There has been an excited coal market in the last few days, because of the large stoppage of work in South Wales. This has thrown many orders into this market, and made the whole of the coal trade irregular in demand and higher in price. Northumbrian steam coals have shot up in price to 9s. 6d. per ton f.o.b.; but if the Welsh stoppage be continued a few days longer, prices will advance with rapidity. Steam smalls are 4s. per ton. In the gas coal trade much interest has centred in the contracts for the supply of the South Metropolitan Company, which are about settled on the basis of 6s. 10d. per ton f.o.b. The demand for gas coals is not very heavy, but is fully equal to that usual at this season; and most of the contracts for shipment are at an increase of from 4d. to 7d. per ton. Manufacturing coals are unchanged in quotation—prices having been fixed by long contracts. In gas coke the shipments are well maintained; and as the production is now reduced to the spring average, the stocks are tending to decrease in some cases. There is no alteration in the price this week.

Scotch Coal Trade.—The tone of the coal market is healthy; the demand continuing good, and prices being well maintained. Forward inquiries are coming in more freely. A number of contracts have been completed, including several foreign ones; and in these the prices are found to be a little in advance of those of last year. The quotations are: Main, 6s. 6d. to 6s. 9d. per ton f.o.b. Glasgow; ell, 7s. to 7s. 6d.; and splint, 7s. 3d. to 7s. 6d. The shipments for the week amounted to 135,023 tons—an increase of 6 tons upon the preceding week, and of 5371 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,547,306 tons—an increase upon the same period of last year of 36,231 tons.

Water-Works Purchase Question at Maldon.—The Maldon Corporation last Tuesday passed a resolution to the effect that the Bill which has been introduced into Parliament by the local Water Company should be altered by way of amendment by the insertion of fresh clauses to carry out the agreement that has been entered into between the two bodies for the transfer of the undertaking. The Corporation also decided to join the Company in the promotion of the Bill.

Kimberley Water-Works Company.—The report of this Company for the year 1897 states that the working account shows a balance of £31,108, and a net available profit of £25,493. The Directors propose to write off £3542 from construction, £1100 from property account, transfer £5099 to the contingency fund, and pay a dividend of 5 per cent. The consumption of water for the year increased by 27,822,000 gallons over 1896, representing a money value of £2811. The supply to the townships continues to show an increasing ratio to the demands of the mines, which the Directors consider a healthy feature of the business.

Frith Hill, Godalming, and Farncombe Water Company, Limited.—The annual meeting of this Company was held a few days since under the presidency of Alderman J. C. Collier, J.P., the Vice-Chairman. The report and accounts for the year ending Dec. 31, 1897, showed that after payment of interest on debentures, the net profit (including the balance from the last account) was £864, out of which it was proposed to pay a dividend at the rate of 2½ per cent. per annum, free of income-tax, the balance being carried forward. The Chairman, in moving the adoption of the report, referred to the difficulties the Company had to contend with during the first nine months of the year. The amount overspent on works, as against the capital issued, was £6700; and the outstanding liabilities at Christmas on capital account came to £2316—a total of £9016. Roughly speaking, the capital which had to be issued in the future for engagements entered into by the Company represented £10,000. The debentures issued at the present time absorbed £220 per annum. The capital was £35,000; and adding the £10,000 made £45,000. To pay a dividend of 5 per cent. on this required £2250, and to pay debenture interest and the dividend on the capital to be issued would take £2450. The net trading revenue for the six months ending March 25 showed a profit at the rate of £2400 a year. This did not provide for depreciation or Directors' remuneration, but the number of consumers would no doubt increase, and the amount realized could be very largely set aside for depreciation. Arrangements had been made for further developing the works, and for carrying the mains through a comparatively sparse district. The report was adopted.

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The Public Lighting of Leeds.—The lighting of the streets, alleys, &c., of Leeds during the past twelve months has cost the Corporation £27,901, or about £1000 more than was prophesied it would do on March 25 last year. The expenditure on the same object for the ensuing twelve months is estimated at £27,511. During the past year the Lamp Committee have authorized the erection of 613 new lamps.

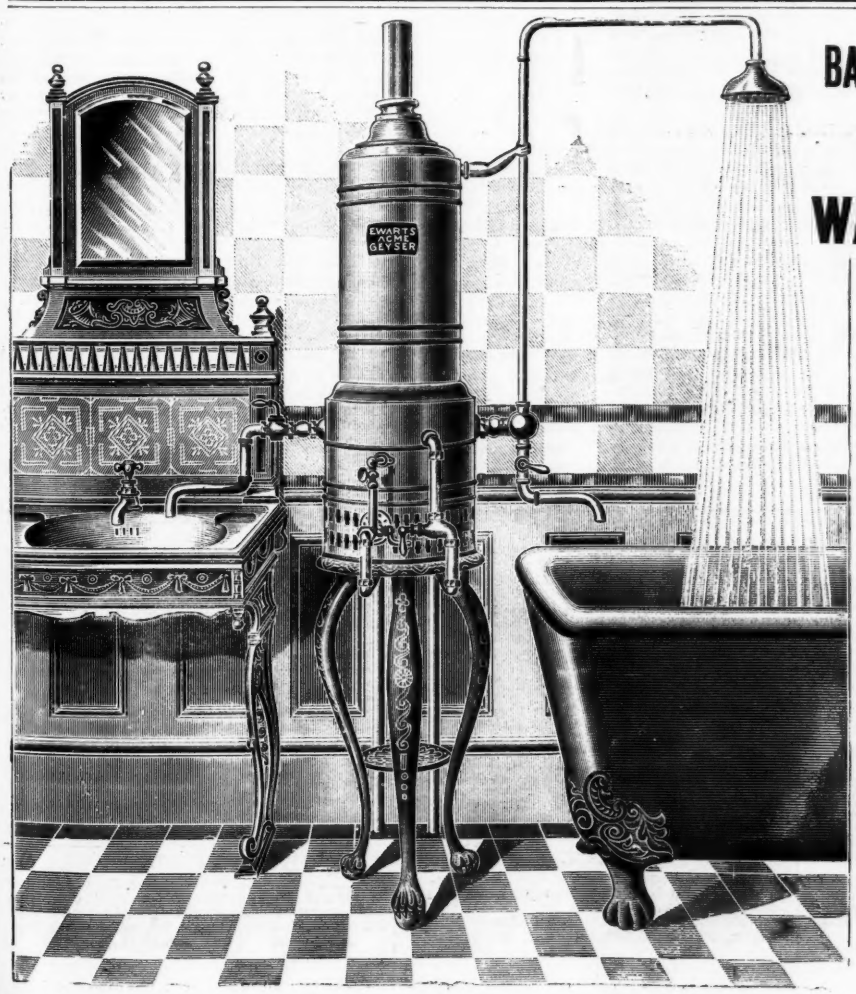
Austrian Incandescent Gas Company.—The Vienna Correspondent of the "Financial News," writing last Thursday, said: "The Austrian Incandescent Gas Company (System Auer) issues 200 new shares at 1000 florins each. The old shares, of which 1500 exist, now stand at 1100 per cent. The new shares Dr. Auer receives *franco valuta* for his new invention in respect to the electric incandescent lamp. By this a great saving in the electric current and an increased power of light are possible. In the clear profits of the business to be carried on separately, Dr. Auer will participate to the extent of four-sevenths, the Company to the extent of three-sevenths. Any premium realized goes to Dr. Auer."

The Cinematograph at Gas Exhibitions.—Messrs. Richmond and Co., Limited, have lately added to the attractiveness of their exhibitions and cookery lectures by illustrating, in a lifelike and humorous manner, by means of the cinematograph, the advantages of gas cooking-stoves as compared with ordinary coal-ranges. The films have been specially prepared at the Company's works at Stratford; and when thrown upon the screen there is an absence of the indistinctness and vibration generally associated with exhibitions of the cinematograph. At first these "animated photographs" were shown on one night only during the course; but they have proved so attractive that they are now exhibited on three nights out of five.

Gas-Works Extensions at Minehead.—In consequence of the steadily increasing demand for gas, the Minehead Gas Company recently decided upon a considerable extension of their works. This has now been carried out, with results which entirely remodel the undertaking. The works were originally built in 1869, and were enlarged by Messrs. Willey and Co., of Exeter, ten or twelve years ago. The same firm have carried out the present extension. With the exception of a gasholder and three benches of retorts, everything is new, including another gasholder, the purifiers, scrubbers, ammoniacal liquor tank, and station meter. The capacity of the works has been increased from approximately 5¼ million to 20 million cubic feet; and the storage capacity from 22,000 to 47,000 cubic feet; while provision has been made for the storage of 300 tons of coal instead of only 40 tons as before. The new works were recently formally handed over to the Company by Mr. H. A. Willey, who assured the Directors that better works for their size did not exist in the country. Mr. J. R. Davies, on behalf of the Directors, spoke in high terms of the able manner in which Mr. Willey has carried out the work, which had, he said, given satisfaction to all the Directors. The Rev. J. U. Todd, amid cheers, turned the valve, which allowed the gas to pass into the mains, congratulating the Company and the town on the extension of the gas-works. Subsequently the party were entertained to luncheon by Mr. Willey, who, in the course of the proceedings, presented a silver salver to the Rev. J. U. Todd as a memento of the occasion.

The Amalgamation of Incandescent Gas-Light Companies.—An extraordinary general meeting of the shareholders of the Incandescent Gas-Light Company, Limited, was held last Tuesday, at the Offices, York Street, Westminster, to confirm the resolutions passed on the 14th ult. (see *ante*, p. 611) to wind up the Company and distribute the assets. Major-General de la Poer Beresford formally moved the confirmation of the resolutions. The motion was seconded by Colonel Pigott, and carried. Extraordinary meetings of the English Incandescent Gas Share Company, Limited, the Irish Incandescent Gas-Light Company, Limited, the Austrian Incandescent Share Company, and the Second Austrian Incandescent Share Company, were also held, at which similar resolutions were confirmed. Cheques for the cash and certificates for the fully-paid stock and shares of the Welsbach Incandescent Gas-Light Company, Limited, to which holders of shares in the Incandescent Gas-Light Company, Limited, the English Incandescent Gas Share Company, Limited, the Austrian Incandescent Share Company, Limited, the Second Austrian Incandescent Share Company, Limited, and the Irish Incandescent Gas-Light Company, Limited, are entitled, and also cheques for the principal money, bonus, and interest payable to the holders of the first mortgage debentures of the Incandescent Gas-Light Company, Limited, have been posted to the registered addresses of such shareholders and debenture holders. The cash so distributed amounts in the aggregate to £1,784,209, and the stock and shares to £885,925; making together £2,670,134.

Responsibility of Swansea Councillors for the Cost of the Opposition to the Gas Company's Bill.—The Mayor of Swansea (Mr. Aaron Thomas), who is a Solicitor, has been interviewed (says the "South Wales Daily News") as to the position the Corporation are in through Mr. Justice North granting an injunction, on the application of the Gas Company, restraining the Corporation from charging the costs of their opposition to the Company's Bill because of an omission to get the ratepayers' consent at a town's meeting. The Mayor says that Mr. Justice North seemed to have taken the question of the price of gas as too unimportant as a right and privilege, and consequently that it did not come under the head of rights and privileges of the Corporation. He certainly thought the Corporation ought to take the case to the Court of Appeal. As the matter now stood, there was "a pretty kettle of fish;" for if the Corporation had no right to apply the borough funds in this direction, the bill would have to be paid by the members of the Corporation themselves, as the Corporation unanimously decided to oppose the Company's Bill after the Town Clerk had reported and recommended them to do so. The decision of Mr. Justice North was a serious one, because it affected every corporation in the country; and he thought the case for the appeal was likely to be taken up by the Association of Municipal Corporations. Asked whether the Local Government Board could not give special permission to take the money from the borough fund, his Worship replied that if the Courts of Law said the Corporation had not acted legally, their action had not been legal, and nothing else could make it so. There is no doubt whatever that Mr. Justice North's judgment has occasioned the liveliest satisfaction in many quarters. It is felt that the Corporation have adopted too aggressive and contemptuous an attitude towards the Gas Company.



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West Gloucestershire Water Company.—Steady progress continues to mark the accounts of this Company. They refer to the six months ending Feb. 26, and show that after paying all working expenses and interest on debenture stock, there was a net profit of £1515, which makes a total of £1616 to the credit of the revenue account. Of this sum £1480 is to be distributed in paying a dividend at the rate of 3½ per cent. per annum.

Odessa Water-Works Company, Limited.—A meeting of the shareholders of this Company, which is in liquidation, was held last Thursday at the Cannon Street Hotel. Sir Peter Spokes, who presided, said the total receipts from the commencement of the liquidation, 2½ years ago, had amounted to £436,000 in round figures, and the payments to £410,000; leaving a balance of £26,000, which it was proposed to deal with as set out in the accounts. There would then remain £229 to be carried forward. The payments for the whole period included a sum of £192,870 in discharge of the debenture debt and interest; and a return of £5 a share, aggregating £212,360. Having expressed the hope that some small amounts might yet be recovered for distribution, he moved a resolution to the effect that the scheme for the distribution of the assets now in hand be approved, and that £3250 be voted to the Liquidators as remuneration for their services. The motion was agreed to.

Tynemouth Gas Company.—The annual report and accounts of this Company (an extract of which has already appeared in these columns, *ante*, p. 603) were presented to the shareholders last Tuesday by Mr. J. B. Williamson, the Chairman of the Board. In the course of his address, he said the past year had been one of steady progress. They had made 283½ million cubic feet of gas, against 260 millions in the previous year—an increase of 23½ million feet. During the same period, they had carbonized 27,960 tons of coal, against 26,013 tons in 1896. They had received £486 more for coke, and £332 more for sulphate of ammonia; but tar came out very badly—giving £379 less than the preceding year. Taking the residuals together, however, they showed an increase of £439. Mr. Crawford seconded the motion, which was supported by Mr. Dodd, who spoke of the excellent services rendered to the Company by Mr. W. B. Davidson, their late Secretary, who had been granted a retiring pension. In giving Mr. Davidson that acknowledgment, he said the Directors had exercised a wise discretion. The motion was unanimously carried. A dividend of 2½ per cent. on the consolidated stock, making 5 per cent. for the year, was declared.

Armagh Gas Company.—At the recent annual meeting of this Company, the Directors reported that, owing to an increase in the price of coal and a reduction in the charge for gas, the net balance available for distribution was £1135, as compared with £1235 for the year 1896. Notwithstanding this falling off, the Directors were gratified at being able to pay the usual dividend of 2s. per share, free of income-tax. This would absorb £1080, and leave £55 to be carried to the reserve fund. The Engineer and Manager (Mr. J. Whimster) presented his report, in the course of which he stated that the ordinary retort-house repairs for the current year will be a little more extensive than usual; and that the question of providing larger purifiers would shortly have to be faced. The Chairman (Mr. W. J. Best) moved the adoption of the Directors' report; remarking that, taking all the circumstances into account, he considered it very satisfactory. The motion was carried. A vote of thanks having been accorded to the Directors, a similar compliment was paid to Mr. Whimster, to whose attention and good management, the Chairman said, the success of the Company was due. Mr. Whimster acknowledged the vote, and thanked the shareholders for this renewed expression of their confidence in him.

Monte Video Water-Works Company, Limited.—At the ordinary general meeting of this Company held yesterday, the Directors submitted the audited accounts for the past year. The gross revenue amounted to £77,320; being a decrease of £2905 as compared with the previous year. The net income amounted to £47,364, against £51,356 in 1896. After providing for interest and other charges, and setting aside £2000 as provision for possible loss on outstanding accounts, there remained an available balance of £24,811 at the credit of the profit and loss account. Out of this an interim dividend of 2½ per cent. was paid on the 1st of November; and the Directors recommended a further dividend of a like amount (making 5 per cent. for the year), free of income-tax; carrying forward a balance of £4811. The services in operation decreased to the number of 123 last year as compared with 1896, and now stand at 10,673. The disturbed state of political matters during the past year, together with the partial failure of the harvest, had a very depressing effect on the condition of trade in Monte Video; and, in consequence, all public and private enterprise suffered in a greater or less degree. The Directors considered it satisfactory that, under these adverse circumstances, the Company had been able to earn the usual dividend of 5 per cent. on the share capital.

Torquay Gas Company.—The annual meeting of this Company was held last Thursday week—Mr. W. H. Kitson, J.P., in the chair. The report of the Directors stated that the total receipts in the year ended Dec. 31 last were £25,859, while the expenditure was £19,202; leaving a balance of £6657 to be carried to the profit and loss account. There had been slight increase in the consumption of gas, in spite of the mildness of the season. This was owing in great measure to the introduction of prepayment meters, more than 400 of which had been fixed. The Chairman, in moving the adoption of the report, congratulated the shareholders on the position of the Company, which he said continued to show steady improvement, while their shares realized during the past year the highest price hitherto known. They had to record the introduction of the electric light, together with the fact that at its installation they had to call in the services of the Gas Company, who would have no objection at some future time to render any assistance they could to the electric light. The appeal against the assessment attempted to be forced on them by the Torquay Overseers ended in the discomfiture of the Overseers and in the reduction of the Company's old assessment, and a loss to the town of some £650 rating power. The gas sold last year was 130 million cubic feet, against 127 millions in 1896. The increase was due mainly to the introduction of prepayment meters, and to the large number of consumers who had realized the advantages of gas for cooking and heating. During the past year 180 new stoves had been let out on hire. The manufacture of gas cost £14,534 15s. 11d., as against £13,882 in 1896; by the sale of gas they received £19,629, against £19,063; and by rental of meters, &c., £917, against £852. Residuals realized £4696 14s., as compared with £4225. Their reserve fund had increased from £8061 to £8306. The dividend would require £6793, which was slightly more than the balance in hand on the year's accounts. The motion was agreed to.

Messrs. E. Cockey and Sons, Limited, of Frome, have recently received instructions to supply two scrubber-washers—one capable of passing 1,000,000 cubic feet of gas per day for the Staines Gas-Works; and the other, 750,000 cubic feet per day for the Ilford Gas-Works.

In a previous issue it was stated that Messrs. Falk, Stadelmann, and Co. had supplied a number of their "Veritas" arc lanterns to the Liverpool Corporation for street lighting. They ask us to correct this statement, as they now understand the lanterns are not for this purpose.

It is reported that Messrs. Crossley Bros., Limited, of Manchester, have designed a new pattern gas-engine for the smallest users, or even for amateur requirements. It is an exceptionally small horizontal engine—the smallest, in fact, the firm have yet produced—and which they have styled their eight-man power engine, although it will work up to two-horse power if required. It is said to be economical in working.

Under the auspices of the Bradford Corporation, a series of cookery lectures, accompanied by a display of gas-stoves, was delivered last week in the saloon of the Bradford Mechanics' Exhibition by Mrs. Hunter. The range used in the demonstrations was the "Metropolitan," manufactured by the Davis Gas-Stove Company, Limited. Messrs. John Wright and Co. have been holding an exhibition in the small Colston Hall, Bristol, in conjunction with which a series of cookery lectures has been delivered by Miss Ball. Swansea was visited during the past week by Messrs. Fletcher, Russell, and Co., Limited, specimens of whose manufactures were on view in the Albert Minor Hall. In connection therewith, Miss Rose Brown delivered a number of instructive and interesting lectures. The same firm have been exhibiting at Huddersfield during the week in connection with the Corporation Gas Department, with lectures by Mrs. H. M. Young. Messrs. Richmond and Co., Limited, have lately held very successful gas exhibitions with cookery demonstrations at Ilford, Romford, Tiverton, Torrington, and other places in the South of England; also at Blackpool, Southport, Manchester, and Salford. The Gas Commissioners of Dunfermline held an exhibition of Messrs. John Wright and Co.'s gas cookers and fires in St. Margaret's Hall, Dunfermline, last week. Miss Wright was the lecturer. On Thursday night she cooked a four-course dinner with a consumption of 25·63 cubic feet of gas, which is equal to little more than ¾d. worth. An exhibition promoted by the British Gaslight Company has been held at Norwich—the firms contributing apparatus being Messrs. Fletcher, Russell, and Co., and Messrs. John Wright and Co. At the formal opening of the exhibition, the Gas Engineer, Mr. John Young, stated that the Company had decided to considerably reduce the rentals charged for gas-stoves, would sell them at 25 per cent. less than list price, and would fix them free of charge. The cookery demonstrations were in the hands of Miss Maud Lewis. From Tuesday to Friday last, an exhibition of the Cannon Hollow-Ware Company's "Hercules" gas-cookers and other labour-saving domestic gas appliances, was held in the Town Hall, Smethwick, under the auspices of the Smethwick District Council. Each day free cookery demonstrations were given by Madame Helena.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications *re* Oxide to the Company as above.

WINKELMANN'S "VOLCANIC" and "VOLCUM" CEMENT. Fire Resistance up to 4500° Fahr. In use in Gas-Works all over the World.

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182, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

Telegrams: "Volcanism, London."

J. & J. BRADDOCK, Globe Meter Works, Oldham.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.

Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see p. 794.]

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality.

SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

BROTHERTON & CO.

Offices: Commercial Buildings, LEEDS.
Correspondence invited.

TO GAS AND WATER OFFICIALS.

SPECIALLY favourable terms for Cycles.

First-Class Workmanship and Material guaranteed. Art Catalogue post free.
MELROSE CYCLE COMPANY, COVENTRY.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 738, last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

GWYNNE & BEALE'S
PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 65,095. Holborn.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS;

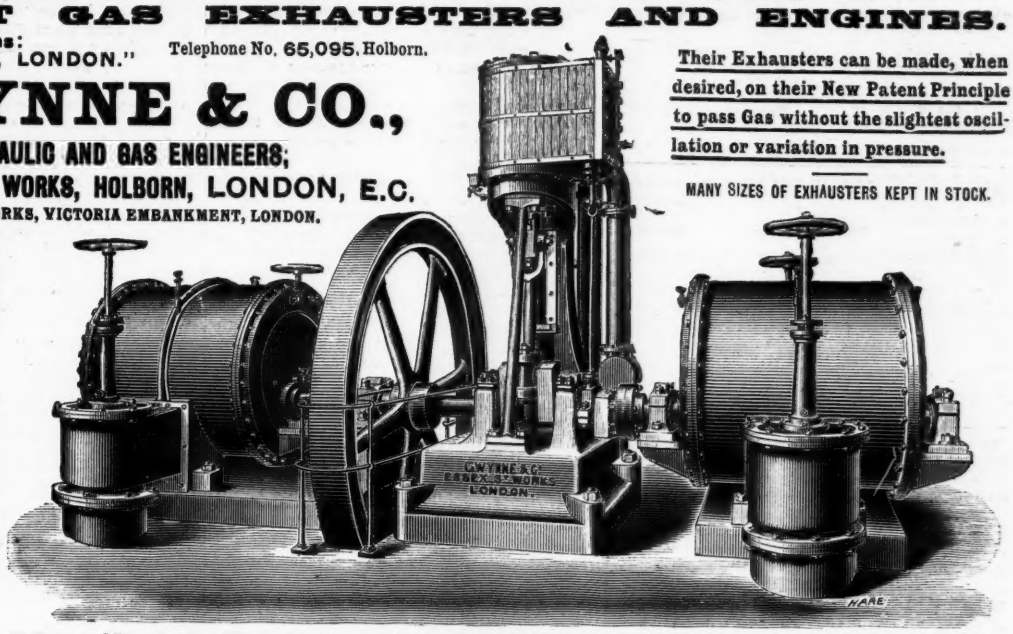
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 36,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

EASTER HOLIDAYS.

NOTICE TO ADVERTISERS.—In consequence of the EASTER HOLIDAYS, orders with respect to ADVERTISEMENTS shou'd be received at the Office *not later* than THE FIRST POST ON SATURDAY NEXT.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TUBES for Gas, Steam, and Water (all Sizes) Welded or Riveted. TANKS, HYDRAULIC MAINS, RETORT-LIDS, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE. Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

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JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

IMPORTANT.

OLD Retorts made equal to new by repairing them with CROWTHER'S PATENT STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Can be used in Hot or Cold Retorts; and "A1." for Mouthpiece Joints. Satisfaction Guaranteed.
CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

Price 2s., Post Free.

STEPHEN CARPENTER, on the Purification of COAL GAS BY LIME, OXIDE OF IRON, AND ATMOSPHERIC AIR, and the Method of Working Purifiers so that the Lime may be used a second time, with a Description of Carpenter's short Method of Working off the Sulphur Test, and Table for Calculating Results.
S. CARPENTER, Ryde House, 28, Woodhouse Grove, East Ham, ESSEX.

YOUNG Man (age 26) seeks re-engagement as RENTAL CLERK and COLLECTOR to a Gas Company or Corporation. First-class References and ample Security if required.
Address No. 3027, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SON of Gas Manager seeks post as MANAGER or SECRETARY of Gas or Water Works. Thoroughly experienced. Certificates for Chemistry and Gas Manufacture. Good References.
Apply, by letter, to No. 3020, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CLERK OF WORKS, &c.

WANTED, an Engagement as above. First-class Experience on several large Gas and Residual Works under leading Engineers; fair Draughtsman; used to control of Men. Steady, reliable, and excellent References.
Address No. 3033, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at May-day, a Working MANAGER for small Gas-Works. Make 21 millions. Generator System.
For further Particulars apply, with Testimonials, to J. J. BAILEY, BARNARD CASTLE.

GAS STOKER.

THE Epping Gas Company, Limited, require a MAN to do the Night Work, and attend to Exhauster Engine. Wages 22s. 6d. per week.
Apply to
E. ALLEN,
Secretary.
Epping.

GENERAL Foreman required at a medium-sized Gas-Works in Midland. Must be a trained Mechanic. One accustomed to Gas-Works preferred. Salary £2 10s. per week.
Applications, before the 14th of April, stating Age and References, to No. 3032, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Marsden Urban District Council are prepared to receive applications for the position of GAS MANAGER.
The annual production of Gas is 15 million cubic feet.
Particulars of Duties, &c., may be obtained from the Chairman of the Gas Committee, Marsden, to whom written applications must be sent not later than Friday, the 15th inst.
Canvassing Members of the Council prohibited.
Marsden, near Huddersfield,
April 4, 1898.

WANTED, Carbon in 4 Ton Lots, or more.
State Price, f.o.r. at nearest Station, to No. 3031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CEFN MAWR AND RHOSYMEDRE GAS COMPANY, LIMITED, RUABON.

WANTED, Two Second-hand Purifiers, about 8 feet or 10 feet square, with 18-inch lutes, and 6-inch or 8-inch Valves and Connections.
State correct Price, with full Particulars, and where to be seen, to
W. A. CARTWRIGHT,
Secretary.

EXHAUSTER for Sale, second-hand, Waller double-blade, capable of passing 17,000 cubic feet per hour. Price £15.
Apply to Mr. COOPER, Gas-Works, BANBURY.

FOR SALE—12-inch Governor by Peebles. 42 4-inch White's ANTI-DIP VALVES. No reasonable offer refused.
Apply to the MANAGER, Gas-Works, ILKESTON.

GAS-PUMP for Sale, horizontal, one Steam Cylinder, 18-inch bore, and two Gas Cylinders, 17½-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.
Apply, by letter, to No. 2878, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, as a Going Concern—A small GAS-WORKS (Freehold Property) near the Eastern Coast.
The Works are in full working order; and there is a good Coal Business attached.
Apply, in first instance, to Mr. W. H MORGAN, Consulting Gas and Chemical Engineer, RHAYADER.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

FOR SALE—A Modern Sulphate of AMMONIA STILL, built by Messrs. R. & J. Dempster, Manchester, 1893, with separate Liming Compartment. Capacity, with ordinary Liquor, 5000 to 6000 lbs. of Sulphate per day.
For further Particulars, apply to the BRYMBO STEEL COMPANY, LIMITED, near WREXHAM.

HASTINGS AND ST. LEONARDS GAS COMPANY.

FOR SALE, owing to Extensions—
Two LANCASHIRE BOILERS, each about 22 ft. 6 in. by 7 ft., with usual Fittings.
Also forty "WHITEHALL" LAMPS (100 Candle) and COLUMNS.
Apply to the ENGINEER, Gas-Works, HASTINGS.

LEIGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

FOR SALE—Thirty Retort Mouthpieces, with Self-Sealing Lids. Size 21 in. by 15 in., ⌂ shape. No reasonable offer refused.
Full Particulars, &c., from the undersigned.
JOHN FOSTER,
Engineer and Manager.
March 25, 1898.

FOR SALE—
16 Round MOUTHPIECES, 16 in. dia., 4 in. Sockets.
4 " " 16 in. " 6 in. "
6 " " 18 in. " 4 in. "
5 Oval MOUTHPIECES, 21 in. by 15 in., 4-inch Saddle Sockets.
6 Oval MOUTHPIECES, 20 in. by 13 in., 4-inch Saddle Sockets.
With 4-inch DIP-PIPES, BRIDGE-PIECES, and a number of ASCENSION-PIPES and CONNECTIONS.
Apply R. WATSON, Gas-Works, HERTFORD.

FOR SALE, Cheap—The under-mentioned GAS PLANT:—

	Square. Ft. in.	Deep. Ft. in.		
2 PURIFIERS,	8 0	4 6	6-in.	Valves & Connections.
1 "	7 6	4 6	6 "	" "
2 "	5 0	4 0	4 "	" "
1 "	5 0	2 9	4 "	" "

C.I. SCRUBBER, 38ft. 6in. high, 6ft. dia., 14-in. "
CONDENSER, 4 inches diameter, Vertical Pipes.
EXHAUSTER (Gwynne's) 20,000 c.f. per hour 8-in. Valves
Apply to SAML. WHILE AND SONS, 60, QUEEN VICTORIA STREET, E.C.

KNARESBOROUGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS wanted for the Setting of THREE BEDS OF RETORTS (15), exclusive of Retorts, and for the erection of a Generator Furnace to a Bed of Seven.
THOS. MAINMAN,
Secretary.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of about 11,000 Tons of COAL per annum for One, Two, or Three Years.
Specification and Form of Tender may be obtained upon application to Mr. W. Whatmough, Gas Manager.
Sealed Tenders, marked "Coal," to be sent to me not later than Tuesday, April 19, 1898.
By order,
J. H. BALDWICK,
Town Clerk.
Municipal Buildings, Heywood,
March 16, 1898.

AYR GAS COMPANY, LIMITED.

THE Directors invite Tenders for the supply, during the Year from the 1st of May, of 6000 Tons of second-class CANNEL COAL, and 1000 Tons of GAS SPLINT COAL, free on rail at Ayr Railway Station.
Sealed Tenders, marked "Tender for Coal," and giving Name, Analysis, and Quantity of Coal offered, to be lodged with the subscriber not later than the 21st of April inst.
WILLIAM J. POLLOCK,
Secretary.
24, Sandgate, Ayr,
April 2, 1898.

TAR.

THE Direction of the Gas-Works at Rotterdam invite TENDERS for the purchase of the TAR produced during One Year, from the 1st of June next. (Yearly production from about 83,000,000 Kg. of Coal.)
Tenders, stating the price per hectolitre in Dutch Money, and written in Dutch Language on stamped paper, must be delivered at the Office of the Gas-Works, not later than the 13th of April, 1898.
Specifications may be had on application to the MANAGER of the Gas-Works at ROTTERDAM.

BOROUGH OF DARWEN.
CANNEL COAL.

THE Corporation are prepared to receive TENDERS for the supply of 3000 Tons of CANNEL, to be delivered at the Gas-Works Siding during the ensuing Twelve Months.
Forms of Tender and any Particulars required can be obtained from the Engineer and Manager, A. H. Smith, Gas-Works, Charles Street, Darwen.
Tenders to be addressed to the undersigned, endorsed "Cannel Coal," and delivered at my Office by Noon, April 13.
No Tender necessarily accepted.
By order,
CHAS. COSTEKER,
Town Clerk.
Town Clerk's Office, Darwen.

BOROUGH OF DARWEN.
TO TAR DISTILLERS.

THE Corporation are prepared to receive TENDERS for the whole of the surplus GAS TAR produced at their Works for One Year from April 1, 1898.
Form of Tender and all Information can be obtained from the Engineer and Manager, A. H. Smith, Gas-Works, Darwen.
Sealed Tenders, endorsed "Tender for Tar," to be sent to the undersigned not later than Noon April 13.
No Tender necessarily accepted.
By order,
CHAS. COSTEKER,
Town Clerk.
Town Clerk's Office, Darwen.

BOROUGH OF MACCLESFIELD.
TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Works during the Twelve Months commencing the 1st day of May next.
Tenders for the Tar or Liquor, separately, to be sent in not later than Saturday, the 16th of April, 1898, addressed to the Chairman of the Gas Committee, Town Hall, Macclesfield, and endorsed "Tender for Tar," &c.
For Conditions apply to Mr. Newbigging, Engineer, Gas-Works, Macclesfield.
The Committee reserve to themselves the right of accepting any Tender for the Tar or Liquor separately.
The highest or any Tender not necessarily accepted.
W. FREDK. TAYLOR,
Town Clerk.
March 14, 1898.

URBAN DISTRICT COUNCIL OF BUXTON.
(GAS DEPARTMENT.)

TENDERS are invited for the supply and erection of a CAST-IRON TANK, 35 ft. by 25 ft. by 4 ft. deep, with division to form Two Tanks—one for Tar and the other for Liquor—covered with Timber and Galvanized Corrugated Iron.
One TAR SEPARATOR.
Six STEEL ROLLED GIRDERS, 6 in. by 6 in. by 16 in. by 25 ft. long.
Drawing and Specification to be seen, and any other Information to be had, on application to Mr. Smedley, Gas Engineer.
The Committee do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, endorsed "Tender for Tar-Tank," to be sent in not later than Twelve Noon, April 6, addressed to the Chairman of the Gas Committee.
JOSIAH TAYLOR,
Clerk to the Council.
Town Hall, Buxton.

COUNTY BOROUGH OF WIGAN.
TENDERS FOR GOODS.

THE Gas and Electric Lighting Com-mittee invite TENDERS as follows:—

Contract No.	1. Cast Mains and Connections.
" "	2. Wrought-Iron Tube and Fittings.
" "	3. Brass Tube and Fittings.
" "	4. Lead Pipe.
" "	5. Firing and Charging Shovels.
" "	6. Brooms.
" "	7. Wood Troughing and Covering.
" "	8. Galvanized Stove Pipe & Connections.
" "	9. Bar Iron.
" "	10. Street-Lamps.
" "	11. Galvanized Iron Buckets.

The Contracts will be for One Year, commencing on the 1st of April, 1898, and ending on the 31st of March, 1899.
Forms of Tender to be obtained from the undersigned.
The Committee do not bind themselves to accept the lowest or any Tender.
Tenders, sealed, and endorsed with the name of the article tendered for (a sample of which must be forwarded, addressed to the Gas Engineer), to be addressed and delivered to J. J. Charnock, Esq., Town Clerk, Town Hall, on or before Tuesday, the 19th of April next.
J. TIMMINS,
Engineer.
Borough Gas-Works, Wigan,
March 24, 1898.

URBAN DISTRICT COUNCIL OF SMETHWICK.
RETORT-HOUSE.

THE Gas Committee are prepared to receive TENDERS—
(1) For the erection and construction of a new RETORT-HOUSE, including Bench to contain Four Beds of Inclined Retorts; and
(2) Supplying, fixing, and fitting up FOUR BEDS OF RETORTS on the INCLINED SYSTEM, including Ironwork, Elevating and Conveying Machinery, and all Apparatus and Materials connected therewith, and supplying and fixing ROOF for Retort-House.
Drawings and Specifications may be examined, and further Information obtained, on application to the Manager of the Gas-Works.
Contractors will be required to pay the Standard Rate of Wages recognized in the District.
Tenders, sealed and endorsed, to be addressed to the Chairman of the Committee, and delivered to the undersigned not later than the 15th of April next.
By order,
W. J. STURGES,
Secretary.
Public Buildings, Smethwick,
March 28, 1898.

LIVERPOOL UNITED GASLIGHT COMPANY.
TENDERS FOR CANNEL AND COAL.

THE Directors of the Liverpool United Gaslight Company are prepared to receive TENDERS for the supply of 70,000 Tons of CANNEL, and 105,000 Tons of COAL, to be delivered at the various Works of the Company during the period of Twelve Months between the 1st of July, 1898, and the 30th of June, 1899.
Tenders will be received for the whole or any portion of the above quantity.
The Directors reserve the right to accept Tenders for the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.
Full Particulars and printed Forms of Tender can be obtained, on application to the undersigned, at the Gas Office, Duke Street, Liverpool, to whom Tenders (on the printed form only) must be delivered at or before Ten a.m., on Wednesday, April 20, endorsed "Tender for Cannel and Coal."
By order,
WILLIAM KING,
Engineer.
Gas Office, Duke Street, Liverpool,
March 25, 1898.

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.
SALE OF FIVE PER CENT. PREFERENCE STOCK.

NOTICE is Hereby Given, that the Directors have instructed Mr. ROBERT MACK, Auctioneer, to SELL BY AUCTION, at the Offices of the Company, Grainger Street West, Newcastle-upon-Tyne, on Wednesday, the 20th day of April, 1898, at Twelve o'clock noon precisely, £26,600 of the NEWCASTLE-UPON-TYNE and GATESHEAD GAS PREFERENCE STOCK, bearing a fixed Preferential Dividend of 5 per cent. per annum, being part of the moneys authorized to be raised by the Newcastle-upon-Tyne and Gateshead Gas Act, 1896.
For Conditions of Sale and further Particulars, apply to the undersigned.
THOS. WADDOM,
Secretary.
Gas Office, Newcastle-upon-Tyne,
March 28, 1898.

PUBLIC SALE
AT THE END OF APRIL
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THESE Works are completely arranged for the distillation and working up from 10,000 to 15,000 Tons of Coal Tar, and are capable of a further enlargement to 20,000 Tons a year.
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For further Information, inquiries to be addressed to THE SOCIETY OF CHEMICAL INDUSTRY, Frederiksplein 5 AMSTERDAM.
During the Year 1898, Contracts are open at different Gas-Works in Holland for a quantity of about 16,000 Tons.
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MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.
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CONSPIRACY AND PROTECTION OF PROPERTY ACT.—It is required, under a Penalty of FIVE POUNDS, that a printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat. Printed copies of this section, in large type, on broad sheets, price 2/- per dozen, or 10/6 per 100. The Act extends to Scotland and Ireland.

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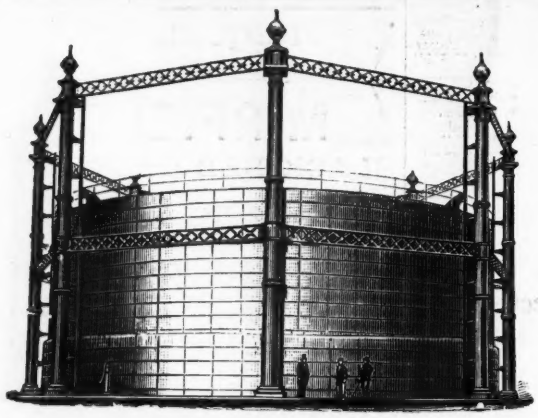

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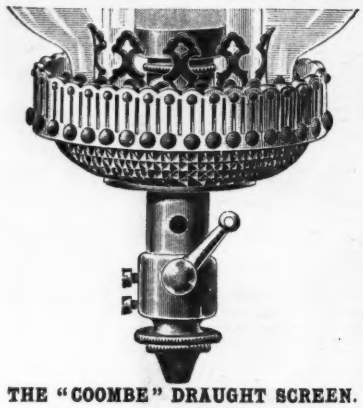

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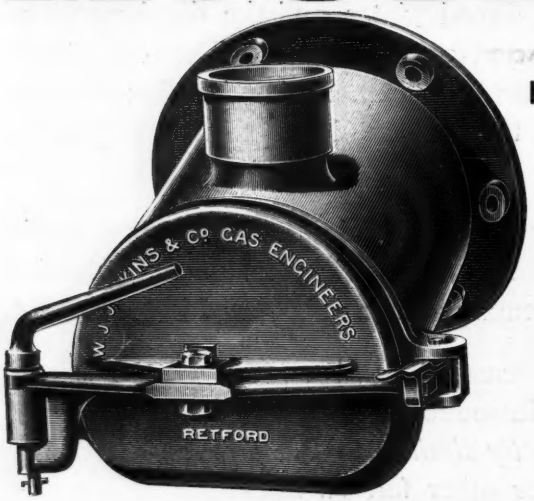

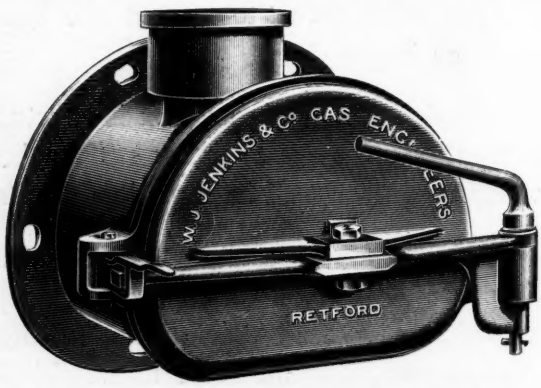

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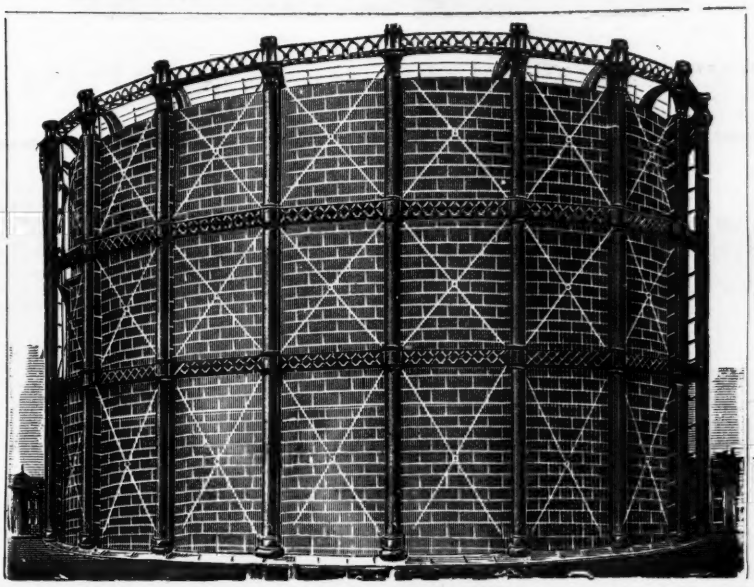

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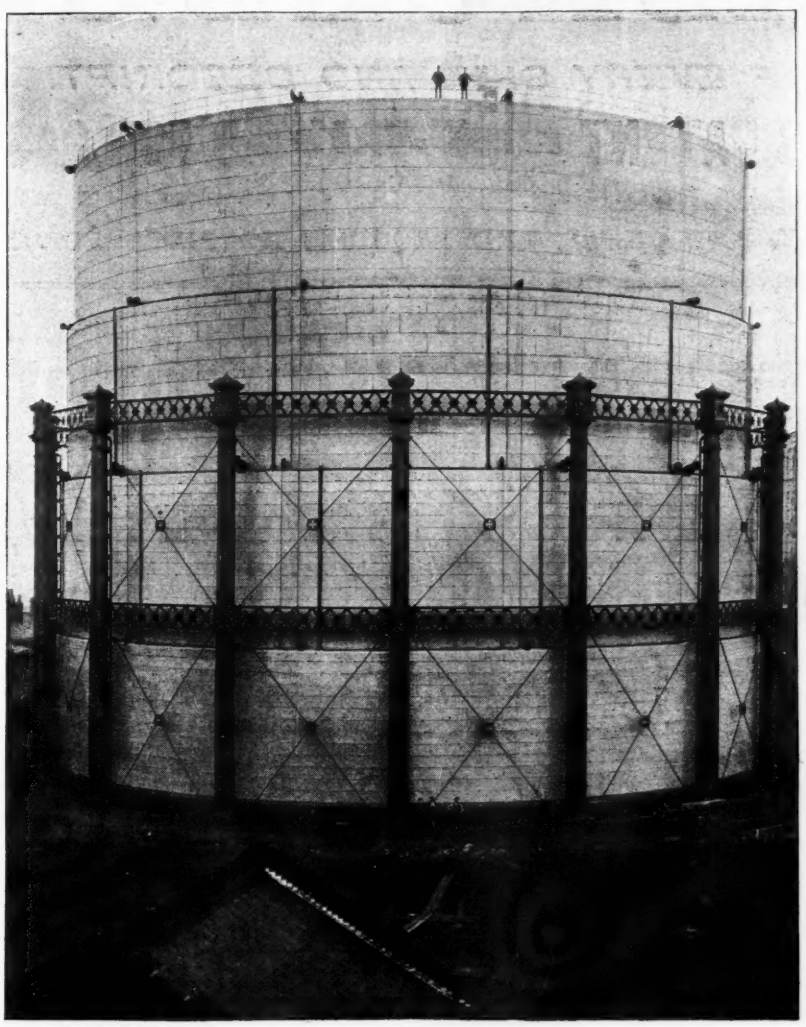

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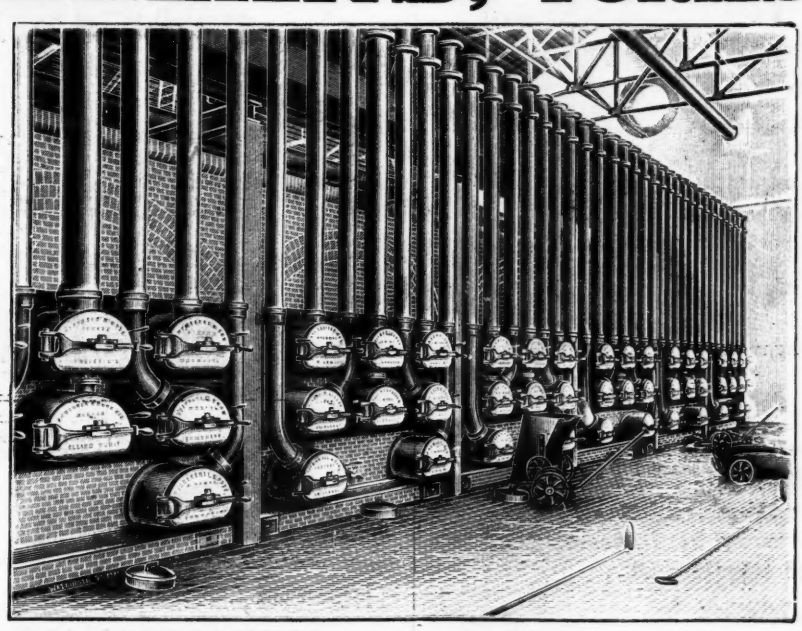

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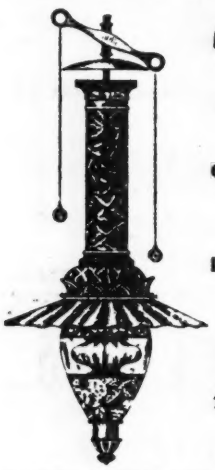

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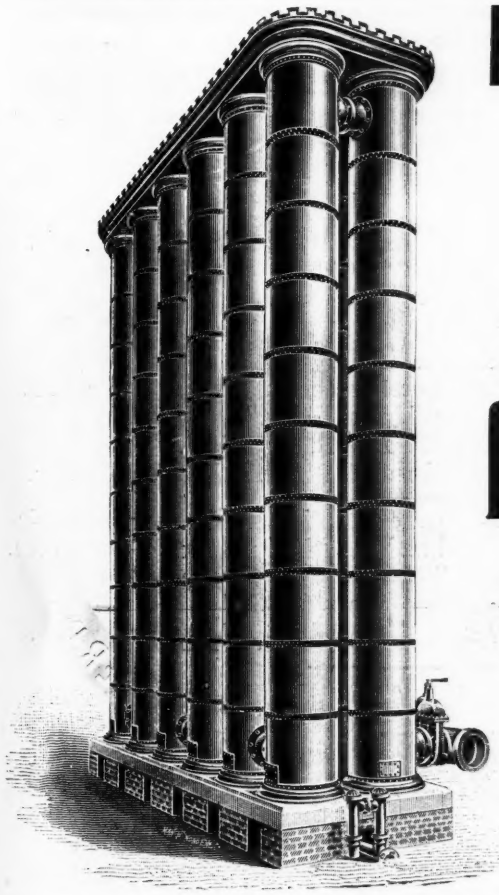

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[See also Advt. p. 758.

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